

A Close Encounter with Atari

# MICROCOMPUTING®

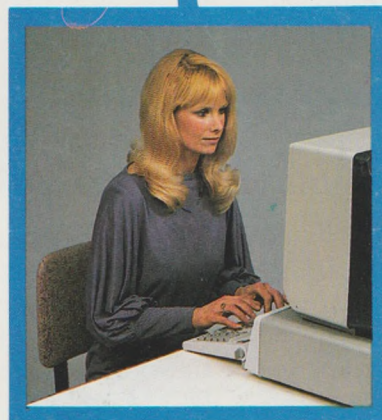
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Number 74

## Which One In Your Future?

- BLMX-80
- Unix
- IDRIS
- Oasis
- Zeus
- Xenix
- MP/M
- UNOS
- OS9
- Turbodos

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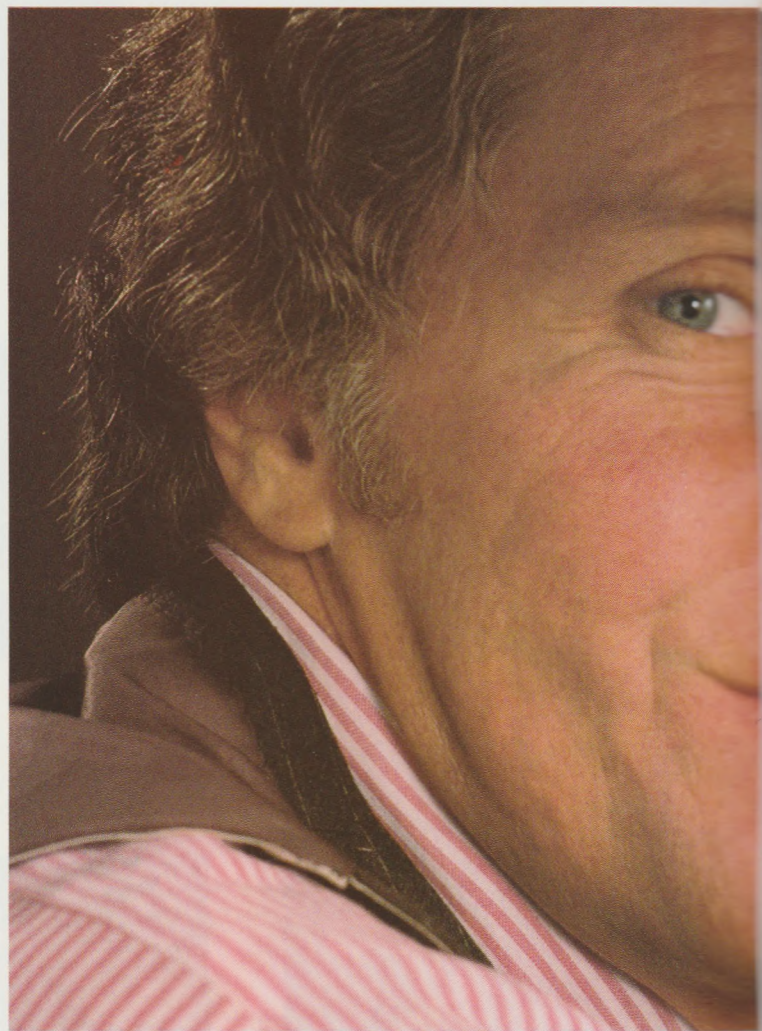
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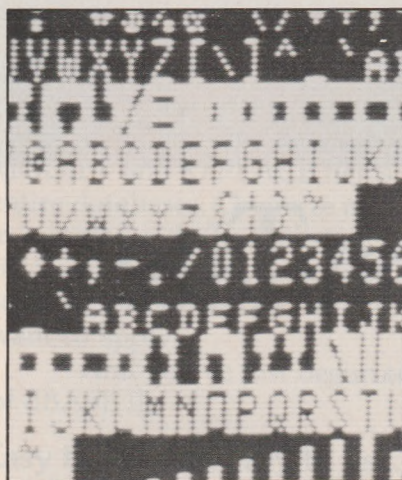
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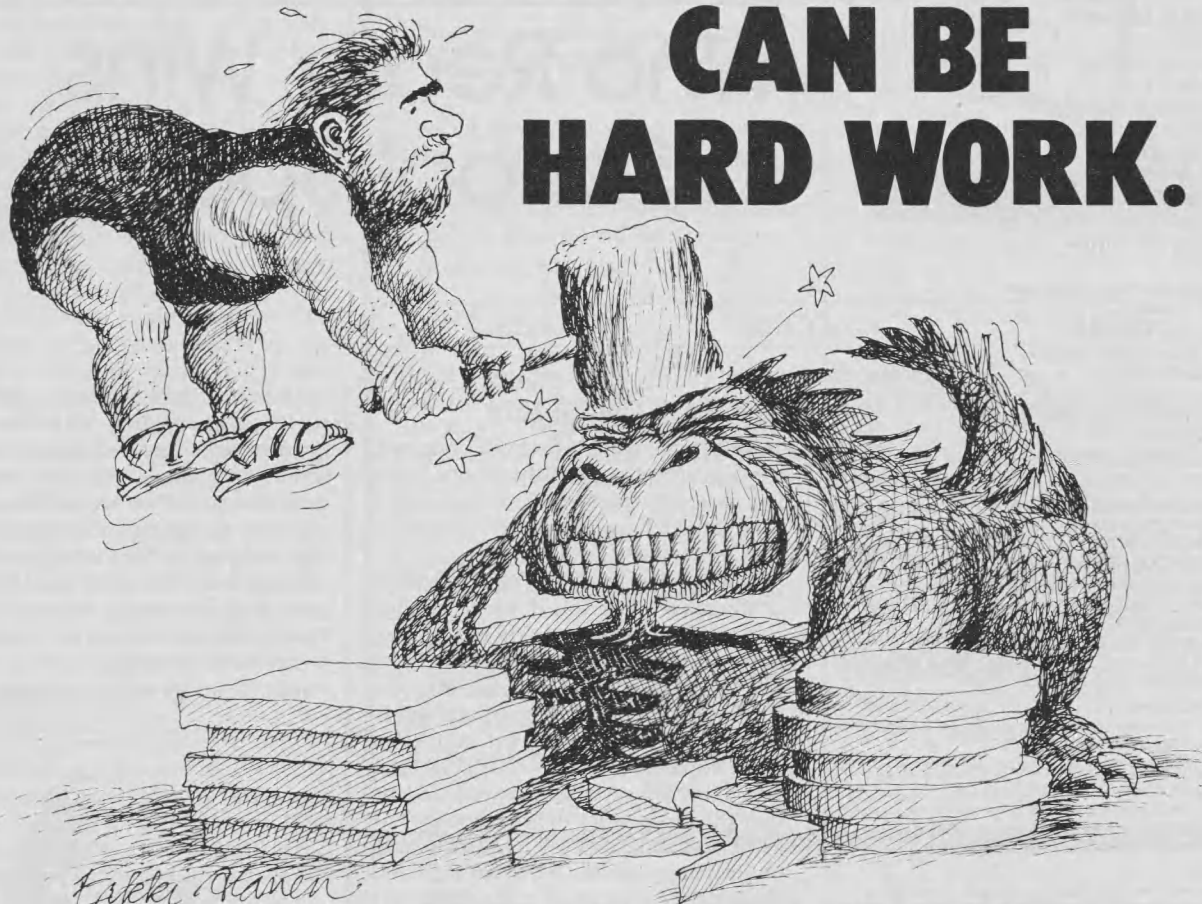
CP/M Monitor, Utility

Apple III Project Scheduler

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## Who Really Wins In School Sports?

### Sports vs Computers

Well, here I go out on a limb again, setting up a great target for potshots. Since I'm used to being shot at and am pretty good at ducking the larger projectiles coming my way, here goes.

This idea has to do with our blessed educational process, about which enough bad really can't be said. There are those who complain that our educational system has been deteriorating ever since the government got into the act and made education both government controlled and compulsory. The more I read of their viewpoint, the more persuaded I become that they have a lot to gripe about. The system stinks, and seems to be getting progressively worse. Well, perhaps all I can do is grumble about it, but that won't stop me from asking some questions.

Take sports. Yes, I know they are fun. I know they develop strong bodies. And they also help colleges bring in money from grads to keep the schools going. But, if I may demur, I have some serious doubts about the value of sports as far as training students for life. Perhaps, if we were to spend a bit more time (and money) on getting our kids interested in high-tech hobbies, we would better prepare them for coping with the cruel world they are eventually going to have to face.

Sports cost our schools a bundle. They have to shell out for the equipment, for the uniforms (in many cases), for the coaches, transportation, meals and so on. Sure, these things are fun and certainly build up school spirit, but if we look at the long-range benefit to the students... I wonder.

Now let's suppose that we put that money into microcomputers to help teach kids about the hardware, software and uses of computers. What would be the long-range benefits of that sort of school investment vs using the money for sporting equipment and uniforms? Obviously I'm prejudiced, but I don't see any contest. Computers are an absolute necessity for kids, who'll always be able to play ball, with or without school equipment.

Other than the handful of kids who fil-

ter into professional sports, who benefits in the long run from all of the money spent on school sports? I know that I sure didn't. Of course, I was lousy at sports. I was the kid that teams fought over... each demanding that the other take me. Remember that when you see me zipping down the ski slopes, OK? I was more into one-on-one contests, such as fencing, than team sports... always the individualist, I suppose.

If you won't go along with spending the



sporting-gear money on computers, how about a 50/50 split? Just spend half of all that money on computers and give the kids a better chance at getting some real long-range benefits. You know as well as I that the kid who develops a serious interest in computers is going to have a tremendous advantage over those who wait until later to try and cope with them. You also know that there really isn't going to be any way to do much in the world of the future unless you are comfortable with computers.

Put that together with the developments we know are coming in communications and you see why computer/communications technology is going to be the biggest industry of the last part of this century. We're heading into direct satellite television broadcasting and teleconferenc-



ing, which will make it unnecessary for people to travel to attend meetings—virtually instant and low-cost communications from *anywhere* to *anywhere*. Just as hams can make phone calls as they walk along the street today, we're heading into the time when anyone will be able to communicate with anyone else from the street, the beach or even while skiing down a mountain.

Hams don't give such communications a second thought because they have been living with this sort of technology for over ten years. Heck, it was over ten years ago that I was able to talk for a hundred miles or more with other hams or via the telephone through ham automatic relay stations while skiing the mountains of New Hampshire, and Vermont and Aspen. This is coming for everyone soon, and the technology is going to require hundreds of thousands of technicians, engineers and scientists. These people have to develop the equipment, to manufacture it, sell it, install it and service it. You won't be able to do it without them.

Well, right now we're looking at most of this talent having to be supplied by Japan, where they are getting kids interested in amateur radio and computers. They're turning out five times as many graduate engineers as we are today... and with half our population. We're going to be in desperate need of these technicians, so if we can't grow them here we're going to have to import them, along with the equipment they are making for us. Is that what you want?

Would you rather have a bruised and broken football player son or an electronic whiz? Are you going to fit him to sell used cars for the rest of his life or own an electronics firm and keep you in luxury in your old age? Let's see if we can't get to those PTA meetings and divert some of that sporting goods money to something of real, solid value—computers. □

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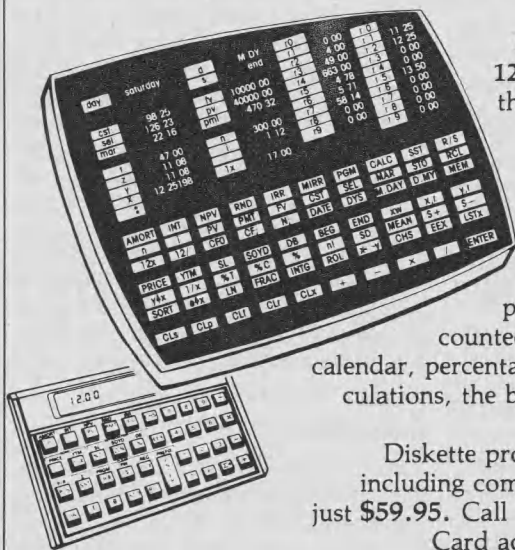
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## Magic Packages For Problem-Solving

## Rating Graphmagic, Mathemagic

Because of the continuing torrent of software being made available for the IBM PC, this will be a month of reviews.

### Briefly Noted

Did you know that you can request from your dealer a copy of IBM's monthly *User Updates*, a useful set of system notes, changes, suggestions and tips? I didn't, but my old friend Arlene of Software 'n' Stuff in Dallas (Source TCZ542) sent me copies from the last three months.

Among the items noted is one that involves a home TV set in use with a PC. According to *User Updates*, the TV should be positioned at least one foot away from the system unit or it could cause disk read errors.

Also included is a program that places the IBM printer in the eight-lines-per-inch mode, sets the page length to 24 lines and does everything else you'd need to do in order to print two pages, each three inches long on a single sheet of paper.

Why would you want to do that? Well, mainly because your screen is 24 lines long. It's a clever way to do screen dumps that match the screen output while saving paper.

Apparently, *User Updates* are sent to dealers, who share them with users on request. Go in and request the updates.

### Pressing On

Press releases I've received this month include one from 3Com Corporation describing a new hardware/software package that will connect PCs together in an Ethernet local network environment. The advantages? Shared peripherals, databases and the like. For more information, contact Rob Brownstein at 3Com, 1800 Embarcadero Road, Palo Alto, CA 94303.

Address correspondence to Thomas V. Bonoma, 45 Drum Hill Road, Concord, MA 01742.

SoftWrights, Inc., (12606 Greenville Ave., Suite 100, Dallas, TX 75243) has announced HelpWare, a "shell" to the PC DOS that provides simplified commands, concurrent printing and a full-featured text editor that creates and modifies files.

And Starware (1701 K St. N.W., Suite 801, Washington, DC 20006, phone 202-296-7283) has implemented a bulletin board system with IBM tips, rumors and product release information. Of course, the Starware people will be glad to take your order for anything from their line of PC products, such as the *Starware Buyer's Guide* for the PC or *The Draftsman* (\$200), a new graphics system.

Enough releases; how about tested stuff? I'll devote the major portion of this month's space to a comparison of five word processors, but I'll tell you about some new software as well.

The MBA (Context Management Systems, 23864 Hawthorne Blvd., Suite 101, Torrance, CA 90505, 213-378-8277) is a \$695 database manager, word (actually, text) processor, spreadsheet program and graphics package. You should get a demonstration from your dealer.

The MBA is a little slow in its current incarnation. But when Context gets the program speeded up and markets a high-quality word processor, it's going to do all the things you want software to do—in one package. It has the ability to maintain all your data in one integrated, mutually-accessible system (see p. 40).

### Math Magic

Mathemagic and Graphmagic (International Software Marketing, Suite 421, University Building, 120 E. Washington St., Syracuse, NY 13202) are current programs that do what the waited-for TK!Solver is supposed to do when it is released.

Mathemagic is an "equation spreadsheet"—you define variables, formulae and other mathematical expressions, and it solves them. Graphmagic, which inputs from Mathemagic, from Visicalc and from its own editor, plots graphs and

computes statistics for the user.

These professionally-done packages are written in compiled Basic (you'll need to buy the Basic Compiler if you want the compiled version to run, and you *should* get that one because it's much faster than the interpreted Basic version). Mathemagic and Graphmagic are quick and apparently have almost unlimited potential for users from about second grade on up.

Mathemagic sells for \$99, Graphmagic for \$89.95. You can buy both for \$159.

Finally, for \$49.95, go buy your copy of FriendlySoft's three-disk PC Introductory Set. (For more information, write to FriendlySoft, 213 Pebblebrook, Arlington, TX 76014.)

The set consists of three disks full of Basic programs. The programs will transform your machine from an expensive paperweight into a useful and fun system and will teach you some of the simpler elements of the Basic program. It also will spark all sorts of ideas for your own programs and maybe even give you the motivation to write them.

The Introductory Set is a well-done package—especially in regard to games. There are 19 of them, including a vision and hearing test. Other highlights: a graphics version of PC Golf, a graphics oil well drilling simulation, complete with sensible economics and the possibility of getting rich, and several "stock" games (craps, hangman, biorhythms, blackjack, Othello).

When you get more serious, disk 1 contains "an introduction to computers," which covers some aspects of history, operating systems and memory. It also contains "anatomy of a program," which will teach you about programming and the use of Basic.

If you get even more serious, disk 3 contains ten programs that together make up a business simulation of general ledgers, inventory reorder points and break-even analyses. This package regularly makes the top ten listings of popular software and, for the money asked, the value provided is excellent.



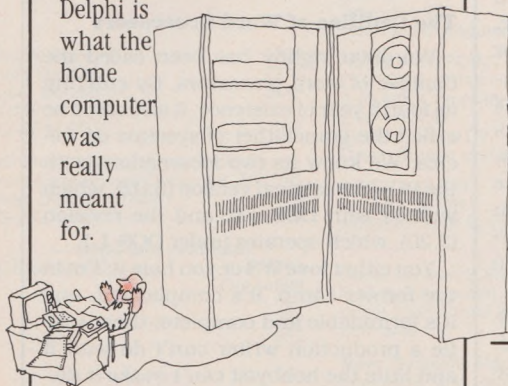
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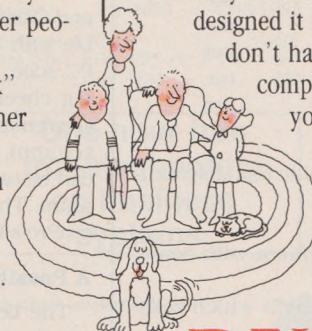
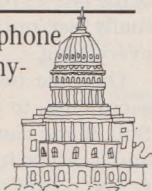
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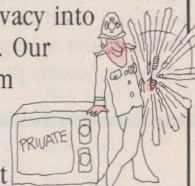
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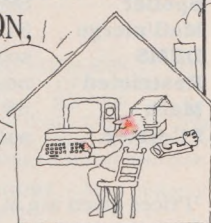
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## Comparing Word Processors

This month I'll examine the new version (3.20) of WordStar from MicroPro, EasyWriter II from Information Unlimited Software, Spellbinder from Lexisoft and a new idea in word processors: PowerText from Beaman Porter, Inc. Because so many of you are familiar with it, I'll also include some of the same summary judgments I made for each of these four programs on Volkswriter, one of the earliest and best PC word processors.

First, Table 1 bears some explaining, since it doesn't follow the "has cursor control by word" evaluative style you may be used to in some reviews. What I have tried to do in Table 1 (once price and other objective factors are dealt with) is to give you an applications feel for the various programs, talk about ease of learning and of use variables and evaluate the possibility of extensions as well as current restrictions to the implementation tested.

You'll notice in Table 1 that I divided users into hobbyists, managers and two classes of writers (low-volume and high-volume).

By hobbyists I mean anyone needing to deal with light correspondence, an occasional article submission or program editing tasks. By manager I mean an individual whose word processing needs are directed toward a large number of short, memo-like correspondences, an occa-

sional report and lots of lists.

By low-volume writer I mean someone who writes less than 12 30-page articles per year (and no books) in addition to his correspondence burden. Most of the low-volume writer's work is nontechnical and doesn't require many footnotes, bibliographic references or mathematical symbol manipulation.

By high-volume writer I mean a book manuscript writer, a "production writer" (like a columnist or a book reviewer) or anyone who makes his living by the written word. The high-volume writer category includes those whose work involves highly-complicated formatting, footnoting and referencing.

I judged each package on the basis of what the user (as I defined him) is likely to require it for. Thus, a too-complicated package is downrated for the manager, while a too-simple one is downrated for the production writer.

In regard to the ease of learning and of use category, I looked for whether a tutorial was given in the documentation, whether sample files were given on the disks, whether there was a help function on-line for the user and how well the particular implementation had been fitted to the PC's special keys and abilities.

The time it took me to become proficient enough at the system so I wasn't always referring to the manual/reference card/help file is what I've labeled "uptime" in Table 1. It pertains not to profi-

ciency, but to some degree of "transparency," or ease of use of the package.

In evaluating the possibility of extensions, I used a subjective point of view—any person who processes words would appreciate extension capabilities, plus the ability to check spelling and grammar, a way to store repetitive information (names and addresses) and perhaps the ability to manipulate some mathematics as well.

Simplified, my definition of the perfect word processor is one that processes information and numbers as well as words, can store and retrieve that information and can check the user's own use of words. I would, parenthetically, also demand graphics capabilities, but I'm afraid that's still in the future.

## The Cadillac of Word Processors

WordStar rightly has been called the Cadillac of word processors. By entering its fourth year of existence, it also could be called the grandfather of systems on micros. We know its two incarnations with the PC—the original version (3.02), which worked with DOS 1.0, and the revision (3.20), which operates under DOS 1.1.

You either love WS or you hate it; I'm in the former camp. It's complicated, and it's formidable and complete; there's little a production writer can't do with it and little the hobbyist can't make it do.

Even the help menus are complicated. The program is a mass of control codes, options and suboptions in the true spirit of the late 1970s, when programmers actually set out to make a program do everything.

This one nearly does do everything, sacrificing, to some extent, ease of use. Still, if you can think of it, WS can do it, and it can do it with just about any printer you'd care to name. In addition to an extensive disk file of printer parameters and an installation program (which is supplied), MicroPro supplies the assembly source code so that you can further modify whatever you'd like. Fitting its production writer/hobbyist writer image, WS works with regular PC disks, hard disks or anything else you'd like to take the time and trouble to patch in.

DataStar, a database manager (DBMS), and CalcStar, a spreadsheet, are compatible with WS and will be available for the PC soon. SpellStar, a workmanlike spelling checker (but not up to Proofreader/Grammatik standards—see last month's column), is fully compatible with WS and can be called from a menu within the program. The same is true of MailMerge, MicroPro's form letter generator.

## A Possible Bug

The best way to summarize WS is to say that using it is like getting closer to a friend. The more time you spend with it, the more amazed you become at how well it works.

There have been reports that the new

	Word-Star	Easy-Writer II	Spell-binder	Power-Text	Volks-writer
<b>Price<sup>1</sup></b>	\$495	\$350	\$495	\$399	\$195
<b>Uptime</b>	1 week	5 days	2-3 weeks	3 days	1 day
<b>For:</b>					
•hobbyist	yes	yes	yes	yes	yes
•manager	maybe	maybe	no	yes	yes
•writer I	yes	yes	yes	yes	yes
•writer II	yes	yes	yes	maybe	maybe
<b>Tutorial</b>	yes	yes	yes	yes	yes
<b>Samples</b>	limited	yes	no	yes	yes
<b>Help-me</b>	yes	yes	no	no	yes
<b>Printers</b>	most	many	all	most	Epson
<b>Speller</b>	\$89	\$175	yes*	no	no
<b>Mail/merge</b>	\$199	***	yes	yes**	no
<b>DBMS</b>	soon	yes	sort of	no	no
<b>Restricted</b>	no	yes	no	yes	yes
<b>Math</b>	no	no	yes	no	no
<b>PC-fitted</b>	some	yes	some	no	yes

<sup>1</sup>Prices given are at full suggested retail. Software often is available at a discount from this price.

\*A spelling program is available—price unknown.

\*\*Can be done from within PowerText, but program also interfaces with some Pascal forms editors (e.g., VersaForm).

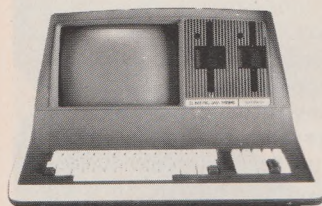
\*\*\*Compatible with IUS' EasyFiler program, a sophisticated DBMS which sells for \$400.

Table 1. A comparison of four word processors, plus Volkswriter.



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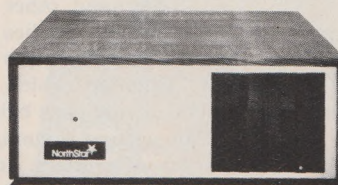
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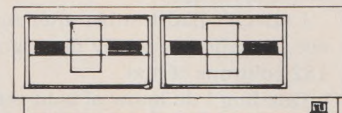
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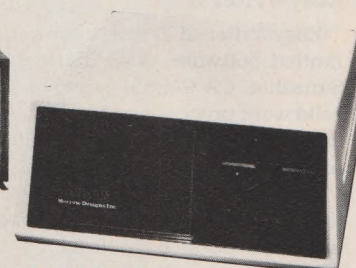


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version (3.20) of WS is buggy. Like one user's letter I have in front of me, the reports usually start like this: "I was trying to format a 163-column diagram, and introduced a control-N at column 143." I don't know the truth, but there are enough negative rumors to be suspicious about the bugs.

I haven't had trouble after months of use, but then I usually don't go beyond 132 columns of text.

One bug I do know of is in the printer installation program (not in WS). It has to do with installing a NEC Spinwriter with WS. The programmers left a parameter out of one line of Basic code in that program, which renders the installation unworkable. Call MicroPro or see your dealer if you've been trying to hook up a NEC to version 3.20—there's a simple fix.

### EasyWriter II

EasyWriter II (from Information Unlimited Software, 2041 Marinchip Way, Sausalito, CA 94965) is one of the most solid word processors around. It's hard to describe how good this system feels running on the PC. It has been highly customized to the PC's special features and the interaction between software and hardware works beautifully.

EWII comes with an indexed, pithy, informative manual and function key stickers for your machine (WS will send these

to you). It's supplied on a two-disk package and requires specially-formatted data disks.

One of the nicest features about EWII is that the user can use it lightly, reading nothing, accepting program defaults and simply function-keypressing his way to a printed page. This makes the system more useful for managers and other users who are more concerned with output than fancy options.

## EasyWriter II is one of the most solid word processors around.

On the other hand, the amateur or professional writer will find a variety of header, footer and other formatting tools, print formats, pitches and typefaces, superscripts, subscripts and even an "undo" function which cancels changes made on any page being edited.

The system is configurable for a wide variety of printers, and tables are supplied for the most popular programs. A "housekeeping" diskette is supplied with the system and allows you to copy documents from one disk to another (both in EWII's special format) or to format a data or backup diskette. In addition,

you can edit system parameters and the word processing ruler, check the integrity of a data diskette, repair a bad diskette and even "import" and "export" data to and from IBM's standard DOS system. For example, VisiCalc tables can be incorporated into EWII document files in this manner.

I know many of you have been burned by the original EW 1.0 and probably are skeptical of anything carrying the prefix "Easy." No need to worry—IUS has produced a blockbuster of a system which, with the EasySpeller II program, is capable of dealing with all your writing needs, no matter what your application is. A mail/merge facility should have been included (EasyFiler has one, but it's \$400). If you're willing to tolerate a nonstandard disk format and the restrictions it imposes, it's hard to beat the EasyWriter II.

### Spellbinder

Spellbinder can be thought of as WordStar with an infinity of options, side programs and macros (which are surprisingly easy to use).

Spellbinder, which supports just about every printer in existence, is moderately well-customized to the IBM PC, though originally produced for CP/M systems like WS. It is supplied on a single disk with a printed tutorial, a macro language

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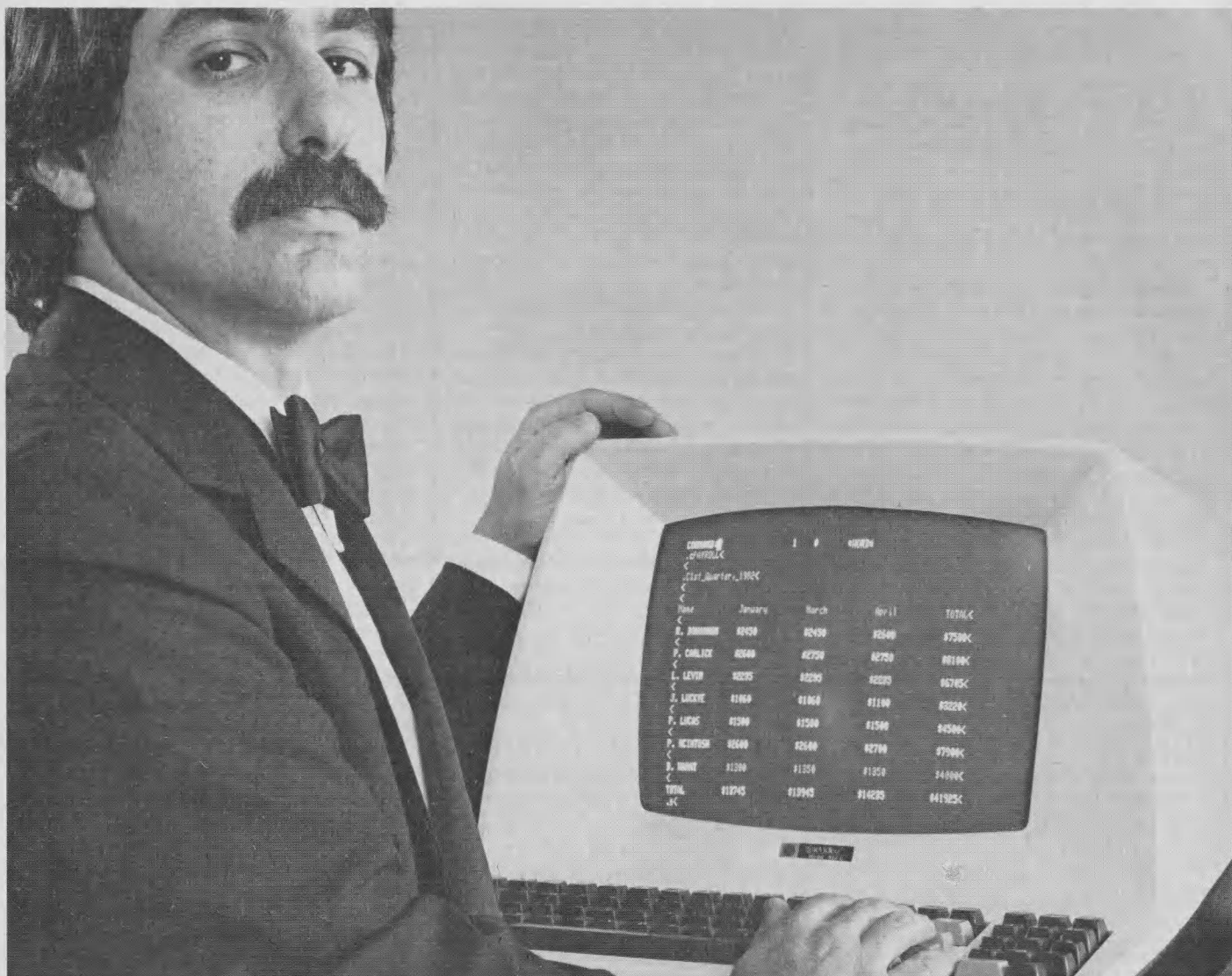


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guide and a reference manual, and has been rated more highly in some comparison tests than WS.

The tutorial will get you up and running with SB, but it barely scratches the surface of this program's capabilities, which are definitely more suited for the user willing to invest the effort. Relatively few examples are provided in the tutorial; furthermore, none are keyed in any way to sample disk files.

The general structure of SB breaks up tasks into those done in the edit mode (you can edit by character, word or line) and in the command mode. Although the user quickly becomes familiar with which commands are legal in which modes, the strategy of a dual program shell makes the system somewhat cumbersome. Nonetheless, SB performs flawlessly and has more commands and options than any other system I'll review here.

In addition to all of these standard features, SB incorporates a variety of "load and go" macros. (A macro is a series of commands that are performed sequentially and automatically by the computer,

usually as the result of a single instruction/keystroke/keyword.) For example, the user can choose to number lines in a file, create and fill in forms (of customer names and addresses, for instance) while storing the data input, print a number of files by setting up a queue, print text in two columns, sort customer or other lists, mail/merge form letters, add columns of numbers and define key words and phrases which can be input into a file with a single keystroke.

If that isn't enough, there's also a calculator option.

If you don't like these macros, SB provides its own macro-writing language, M-Speak, so that you can write and install your own tailored macro commands and programs. No wonder they claim SB is not only a word processor, but an office and data management system.

### PowerText

PowerText by Beaman Porter takes an approach different from the three word processors mentioned above. While WS, EWII and SB attempt to replace the type-

writer (in PowerText's belief), the PT program tries to replace the secretary. It does this by giving the user a "style" diskette with precreated format files on it. Some titles of the possible format files are "memo," "letter" and "document."

The user enters the Pascal text editor (PT is written in Pascal and currently does not support a hard disk), chooses "memo" and enters his program (see Listing 1).

The user saves this file, enters the PT print routine and PT does the rest, producing a memorandum like the one in Listing 2. Format files are easy to modify and create and can be customized to any serial or parallel printer you'd like (a full set for the PC printer is included). Guidelines for letter-quality printers are supplied and PT even incorporates a program that aids you in creating a new format file.

If you tell PT how you'd like your letters, memos and documents to appear, it will take care of the rest and allow you to focus on composing.

The PT editing commands are no slouches, either. PT automatically will space columns across the screen with just a little advice as to how wide you want the second column in relation to the first. The program automatically constructs outlines four deep out of your input with only a couple of keystrokes and will pull headings out of the text of a document and create a table of contents for you.

There are many other features I can't mention here in the interest of space, but if you are more concerned with focusing on your writing than on the program generating it, PT may be for you. The package is professionally done and supplied with lots of example files and a pretty good manual. Two disks are included—a "power" disk and a "style" one. A good customization/installation program is included for any nonstandard options you may have.

### And the Volkswriter (Again)

I've reviewed Volkswriter before, but I'm including it in Table 1 because it's a good workhorse program without the bells and whistles of many of the others. It requires a short training time and it handles the critical requirement of any word processor—it processes words.

There aren't any headers or footers in the current revision, nor is there the ability to use a serial port out of the PC. But, the program is very friendly, it's "bullet-proof" to minor and even major keystroke mistakes and it's a sweetheart of a system to work with when you want to dash off rough drafts.

### Take Your Pick

The PC has come to the point at which there are real, viable word processing alternatives for your applications. The key to the choice is to analyze and understand how useful a processed text would be for you. If you do that, you'll buy right. □

```
/:memo
/to Jim Andrews
/from Tom Bonoma
/sub Your Consistent Lateness
/copies Personnel Department, Ed Taub
/par Jim, your lateness at work has become not only a matter of
concern, but a public spectacle.....
```

Listing 1. Entering of memo in PowerText.

DATE: October 13, 1982

SUBJECT: Project Assignments

FROM: Tom Bonoma

TO: The Staff CC: Bruce Bevoort

```
|This memo is extremely confidential. Please|
|destroy before reading.                    |
|_____
```

Following are the project assignments for the month of July:

Derrick Hall will be assigned to trouble shooting. He will have total responsibility for all incoming trouble calls and mail.

Sophie Salinas will handle inquiries. New customers and new inquiries from present customers will be handled by Sophie.

Alfred Smith will be responsible for all testing. Any new products to be shipped must be signed off by Al.

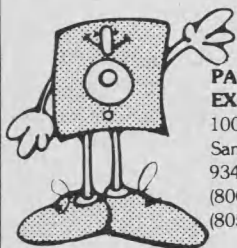
Thank you for your cooperation.

Listing 2. Sample memorandum from the PowerText.

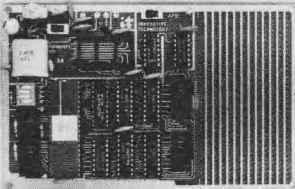


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The APB is an excellent educational aid which allows for evaluation and familiarization of 6801 family members. It is great for prototype development. Since the nuts and bolts are already in place, the designer need only add the necessary interface circuits for a particular application. It can also be used as a simple cost-effective dedicated controller for those limited quantity applications.

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
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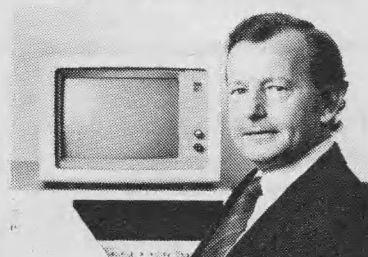
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## A Super Shortcut

### Programming Idea

Commodore systems do not include a computed goto command like the one found on Atari and other systems. You cannot use a command like GOTO X in your program; the GOTO must be followed by a valid decimal line number.

You might argue that you don't need the computed GOTO since you can use ON X GOTO 100,200,300, and so on. But there are instances where it would be much nicer to be able to use a computed argument with the goto command instead of hard numbers.

Well, here's a little trick that can provide computed goto commands along with a few other handy features. What you do is to call a short subroutine that takes the value of a known variable, pokes it into a dummy goto command and then jumps to the goto command just created. The following routine will do just that:

```

10 GOTO100
20 GOTO00000
30 L$=RIGHT$( " " + STR$(L),5)
40 FOR X=1 TO 5: POKE 1038 + X,
  ASC(MID$(L$,X,1)): NEXT:
  GOTO20
100 REM NORMAL PROGRAM
  FOLLOWS...
200 REM...
300 REM...
400 L=300*3: GOTO 30
500 REM ABOVE DOES COMPUTED
  GOTO, TO LINE 900
600 REM...
900 REM TARGET LINE OF GOTO

```

Line 10 skips the computed goto routine of lines 20-40, so normal program flow occurs when the program is first run. Once the program is run, any computed GOTO can be accomplished by setting the variable L to the desired target line of the GOTO and then doing a GOTO 30.

Line 30 converts the target line number into a character string of exactly five characters by adding leading spaces as

*Address correspondence to Robert Baker, 15 Windsor Drive, Atco, NJ 08004.*

necessary. The string is then poked into line 20 following the goto token. Now when line 20 is executed it will do the GOTO with the correct computed target line number.

### No Spaces Allowed

For this routine to work properly, lines 10 and 20 must be the first lines of the program and must be entered exactly as shown. There cannot be any spaces between the GOTO and 100 in line 10, and there must be exactly five digits in the goto token in line 20.

If you need to use a different line number than 100 in the GOTO of line 10, it still will have to have three digits or you'll have to change the number in the poke command in line 40. The number used in the poke command is the address of the goto token in line 20.

Now we have a working computed goto command for Basic programs on PET or CBM systems. If you have a VIC-20 or Commodore-64, the same routine will work on your system with only one small change. The poke address in line 40 must be changed accordingly for your system—4110 for an unexpanded VIC-20 and 2062 for a Commodore-64. This value should replace the 1038 address used for the PET and CBM systems.

OK, so what do you use it for?

First of all, you now have a convenient way to actually compute your goto target line number instead of having to use fixed numbers or extremely long ON X GOTO 100,200,... commands. And you now have something like the "check-pointing" used on larger systems.

The GOTO in line 20 will always be left pointing to the last computed GOTO that was used in the program. If a particular routine detects an error, the program could be constructed so that a simple GOTO 20 would return to the last valid step in the program and continue from there. If you like this idea but don't need computed GOTOS, you could change the GOTO 20 in line 40 to be a return command and then do a GOSUB 30 to set your checkpoints as desired within your program flow.

Going one step further, we could eliminate line 10 and initialize line 20 to GOTO00100. The poke address in line 40

## Programming Tip Makes Life Easier

will have to be changed to 1029 for a PET/CBM, 4101 for the VIC-20 or 2053 for the Commodore-64.

The new line 20 directs program flow to line 100 at the start of the program for normal program execution. With a GOTO 20 at the end of line 40, we now have computed goto commands as before, and line 20 is always left pointing to the last computed goto target line.

However, line 20 is now the first line of the program. If the program is stopped for some reason, the program will now go to the line pointed to by line 20 when it is run again.

This scheme could be used to have a program print instructions only the first time it's run after being loaded. If run again, the instructions could be bypassed automatically by the new value in the goto command of line 20.

Try this program and run it several times:

```

20 GOTO00100
30 L$=RIGHT$( " " + (L),5)
40 FOR X=1 TO 5: POKE 1029 + X,
  ASC(MID$(L$,X,1)): NEXT: END
100 PRINT"THIS APPEARS FIRST
  TIME RUN"
110 L=200: GOTO 30
200 PRINT"THIS APPEARS SECOND
  TIME RUN"
210 L=300: GOTO 30
300 PRINT"THIS APPEARS THIRD
  TIME RUN"
310 L=400: GOTO 30
400 PRINT"THIS APPEARS FOREVER
  ON"

```

By replacing the GOTO 20 in line 40 of the original routine with a return and calling the routine with a GOSUB as mentioned before, you now have real checkpointing. If a program were to call the routine in lines 30 and 40 every time it started a major function, the program could be rerun if an error occurred or if the program were accidentally stopped.

The GOTO in line 20 would direct program flow to the proper point, continuing the program without the user having to know anything about the internal program. All the program user has to do is type Run to restart the program at the proper place.



I'm sure there are a number of other handy uses for this routine. If you think of any you'd like to share, drop me a note and I'll pass it along here in the column.

## Vanilla Pilot

Tamarack Software has announced the release of Vanilla Pilot, a plain vanilla version of the Pilot computer language. The Vanilla Pilot, which retails for \$29.95, is a full-featured Pilot language that includes Turtle Graphics and a set of powerful additions to the resident editor. It will be available for the Commodore 4000, 8000 and 9000 series machines as well as for the Commodore-64.

The Vanilla Pilot editor is used in conjunction with the screen editor and adds a number of features which permit easy program entry and debugging. It has 19 commands (including Find/Change and Trace) and convenient disk and cassette commands.

The Trace command will list the Pilot statement currently being executed in a line at the top of the screen. The disk load command features an append option, while the save command allows a partial save. The run command includes an option to load a program from disk and begin execution.

## Turtle Features

A special feature of the interpreter section is a full Turtle Graphics package. With this, the user can control the turtle's direction and place the "pen" up or down. Additionally, in the Commodore-64 version, the pen can be set to any one of the 16 screen colors. In all versions, the turtle can draw lines and turn left or right under program control.

Another section of the interpreter has a multifunctioned screen command. With this command you can perform any of the cursor movements, and you can switch between uppercase graphics and upper- and lowercase screen displays. In addition, you can set single or double line spacing on the screen displays, and you can reverse the entire screen for dark characters on a light background.

The manual which accompanies Vanilla Pilot was written by experienced educators and was carefully designed for clarity and easy reading. It is fully illustrated and contains a number of programming examples. Also, there's an appendix with all of the statements and commands clearly documented so that an experienced programmer can immediately begin using Pilot.

Vanilla Pilot will be available through your local Commodore dealer, or you can write Tamarack Software, Water Street, Darby, MT 59829.

## More HES Software

As I mentioned in my December column, Human Engineered Software

(HES), 71 Park Lane, Brisbane, CA 94005, introduced several new programs for the VIC-20 that are supplied on plug-in cartridges. I covered most of the new games and Turtle Graphics in that issue, but didn't have time to cover Hesmon. HES Writer and VIC Forth, so here's the information I promised.

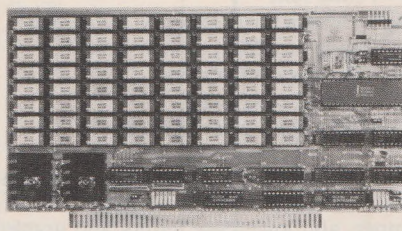
Hesmon is just what you'd expect from its name—it's an easy-to-use machine-language monitor. Single-character commands provide a host of features:

- A—Simple Assembler
- B—Breakpoint set
- C—Compares memory blocks
- D—Disassembles memory
- E—External relinker (facilitates the

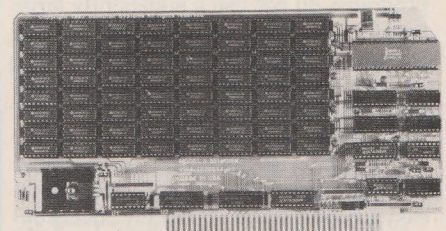
transport of programs from one 6502-based computer to another by translating system call addresses)

- F—Fills memory block
- G—Executes program: no breakpoints set
- H—Hunts for a sequence of bytes in memory
- I—Interprets memory, displays contents in ASCII
- L—Loads program (from tape or disk)
- M—Displays memory contents in hex
- N—New locator (converts absolute address references)
- O—Output divert (allows Hesmon output to be printed or stored on disk)
- P—Prints screen (copies current screen display to printer or disk)

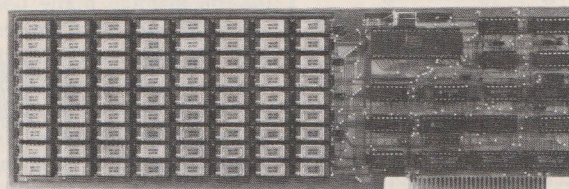
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Q—Quick trace (starts execution with breakpoints set)  
 R—Registers display  
 S—Saves program as a nonrelocating program file  
 T—Transfers memory block to another area  
 U—Tests color RAM  
 V—Verifies RAM  
 W—Walks program (single-step execution)  
 X—Exits to Basic  
 #—Converts decimal to hexadecimal  
 \$—Converts hexadecimal to decimal  
 +—Hex addition  
 —Hex subtraction

Besides all this, you still have the usual ability to modify memory and register contents. A disassembly modify mode is extremely handy.

### Variable Storage

Hesmon uses 33 bytes near the bottom of the machine stack (\$120-\$141) for its variable storage. Most machine-language programs do not use a sufficiently large amount of the stack to interfere with this storage, but it is a possibility to be aware of. Large, complex Basic programs sometimes do use enough of the stack to interfere with these locations.

Hesmon is well-written, as are most HES products. The 32-page manual is easy to understand and nicely covers operation of the monitor, although it doesn't cover the 6502 microprocessor or machine-language programming.

You'll find Hesmon to be similar to the monitor available from Commodore, since they're both based on earlier versions of Micromon and Extramon, which were written for the PET/CBM machines. This package has only one problem area: RS-232 files will not work correctly when the current version of Hesmon is plugged into your VIC-20.

### HES Writer

HES Writer turns your VIC-20 into a sophisticated word processor with advanced features (such as full-screen editing and word wrap-around). With word wrap-around, when part of a word reaches the end of a margin while entering text, the whole word is automatically moved to the start of the next line for you. This eliminates one of the most annoying features found in Word Pro on the PET/CBM machines.

Other features include justification (flush left, flush right or ragged right), centering, page heading and page numbering. Delete, copy and move can be done to single lines or to a range of lines. You can do fast searching for character strings, and text can be previewed on the screen before it is printed. Your text files can be saved on tape or disk and you can even chain several small files into one large file for printing.

Using the HES Writer is much like using Word Pro on the PET/CBM. Your text

is entered by typing it in while HES Writer is in entry mode. While entering text, you are limited to making corrections only on the current line.

Format control commands, preceded by an up-arrow, are embedded within your text. They can appear anywhere in the text, not just at the beginning of a line. You don't have to waste buffer space for command lines like you do with Word Pro.

One nice touch in HES Writer is the use of screen border colors to indicate the current operating mode.

Program commands include:

c—Copies lines  
 C—Changes character color  
 d—Deletes lines  
 D—Enables disk mode  
 e—Edits text  
 f—Finds character string  
 i—Inserts a new line  
 l—Lists lines on screen  
 n—Numbers lines while listing on screen  
 p—Prints text  
 P—Previews formatted text on screen  
 r—Reads text from tape or disk  
 S—Changes screen color  
 T—Enables tape mode  
 w—Writes text to tape or disk

Internal format controls can center text, feed paper to the next page, provide upper- and lowercase letters and graphics and set margins and line spacing.

HES Writer is a worthwhile investment for the average home user who wants simple-to-use word processing capabilities. Its only major drawback is that it supports only the VIC-1515 printer: it cannot be used with an RS-232 printer. Since the program is written in machine language and is in ROM on the cartridge, it cannot be easily modified. However, if you have the Commodore printer, I think you'll find HES Writer useful.

### VIC Forth

VIC Forth is an implementation of the fig-Forth language with the addition of several words to interface to the VIC's sound and color capabilities. Forth is an interactive language that is much faster than Basic, yet is easier to use than assembly language. Programs written in Forth are modular, permitting structured programming techniques, and they're extremely efficient in memory usage.

There are more than 250 "words" included in the VIC Forth and you can add many of your own commands. If you have not used the Forth language before, you will probably find Forth's syntax somewhat strange at first. Don't let it bother you; the Forth programming environment has been honed over a period of 12 years into an efficient system.

In Basic, where some arithmetic operators have different precedences, it's sometimes hard to remember which functions are performed first. You have

to use parentheses quite often to specify the correct order of the operations indicated. With Forth, there's no need to worry; everything is performed left to right in the order found.

The implementation of VIC Forth includes command words to allow you to control the character, border and background colors of the screen. There are five sound control words for manipulating the sound output of the VIC-20.

VIC Forth comes with a full-screen editor that has 16 lines of 64 characters each (standard Forth screen). It will run on a standard VIC-20, although extra memory is recommended. Programs can be loaded or saved from tape or disk. Character output can be sent to any device, including the VIC printer.

All I/O and several other words are "vectored" to allow their functions to be changed at runtime. This allows you to drive a printer (or any other device using I/O) that the system ordinarily may not recognize. As an example, a driver routine could be written to drive a parallel printer over the user port.

I've used the term "word" several times. In Forth, this refers to an identifiable function or command. In some computer languages, words would be referred to as subroutines or procedures. In VIC Forth, words can be from one to 31 characters in length. This allows descriptive names to be used in writing your programs. You'll find that Forth programs are usually easier to read than Basic programs.

### VIC Forth's Manual

The 80-page manual provided with the VIC Forth Cartridge is extensive. It is not, however, a Forth beginner's manual. Still, if you are a newcomer to Forth, it will provide most of the program tools you will need to learn the Forth language.

A list of reference books is provided for further reading and should provide the necessary tutorial information. You should note that the "Starting Forth" manual suggested as a beginning tutorial describes a version called Forth-79 that is not identical to fig-Forth/VIC Forth. A special section in the VIC Forth manual describes the appropriate differences.

All of the manuals mentioned are available from the Forth Interest Group, PO Box 1105, San Carlos, CA 94070. This is an independent group of Forth enthusiasts whose aim is to educate others, answer technical questions and promote Forth. They publish a newsletter ("Forth Dimensions," \$15 per year) and have other publications available.

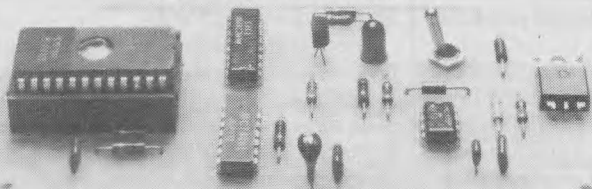
### Misc

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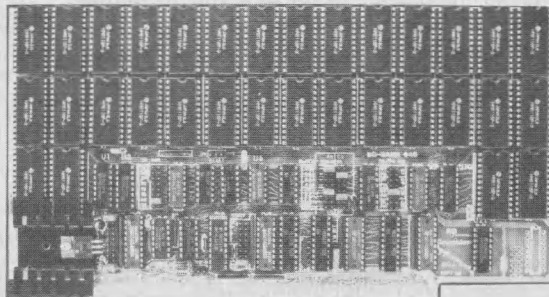
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them. Consequently, discounting has all but disappeared. With this kind of interest, however, there should be quite a bit of software for the Commodore on the way.

The Commodore-64 will work with all VIC-20 peripherals, but if you're about to get a disk drive, make sure you get a VIC-1541 disk. The older VIC-1540 disk will not work with the C-64.

If you already have a VIC-1540 disk, you should be able to get a ROM upgrade to make it, in effect, a VIC-1541. I still haven't been able to find the part number for the ROM or where it will be available, but it should be out by the time you read this.

All Commodore production was shifted to producing VIC-1541 units back in November, when computer stores were just starting to receive their first VIC-1540 disks.

My early testing on the Commodore-64 shows that the two system bugs found in the VIC-20 also appear in the C-64—along with one new quirk.

The problem with Input prompts that are longer than one screen line returning the prompt, along with the input response, is still there. Also, the problem with TAB(x) and SPC(y) functions being the first argument in a PRINT#. command still exists.

Apparently, the Basic found in the C-64 is almost identical to that in the

VIC-20. Don't forget that this is similar to the older Basic 2.0 found in the original PETs and still has the slow garbage-collection routine as well.

The new problem with the C-64 is that the FRE(0) function returns a negative number when you have small programs in memory.

The FRE function apparently uses the integer functions to display the final value and mistakenly uses the upper bit of the larger values in the C-64 for a sign bit in the binary value. Thus, anything with more than 32K is shown as a negative number.

This conversion will display the correct values in all cases:

```
X = FRE(0); IF X > 0 THEN
  X = 65536 + FRE(0)
PRINT X
```

Early versions of the VIC Modem were shipped only with VIC-20 software. Software for the Commodore-64 is now being included along with the VIC-20 versions, so you can use the modem with either system.

A new VICTERM 40 software package provides a 40-column display for telecommunications applications when used with the VIC Modem on a VIC-20 system. It also provides upload and download capabilities for copying program files. The

new package sells for less than \$40.

Elcomp Publishing of 53 Redrock Land, Pomona, CA 91766, is offering a new book by W. Hofacker of Germany titled *Programming In 6502 Machine Language On Your PET & CBM*. It retails for \$19.95.

The title is a little misleading, since the book does not teach you how to program in machine language. It presents complete details on two Editor/Assembler packages, plus a powerful machine-language monitor that can be purchased separately in loadable form.

Advertisements indicate that the book includes source code plus hex dumps and descriptions. However, machine-language source code is provided only for one Editor/Assembler package. The remainder of the machine-language programs or routines are provided only in hex dump form.

There are a number of special characters missing within the text, making it slightly unreadable at times. A few typographical and spelling errors show up, along with a few comments in German.

Since the programs were written for the older Basic 3.0 machines, I suspect the book will be of limited interest. It's mostly a manual for the programs sold separately, but you could enter the programs from the listings provided if you really like to type. □

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All of the Adventures in this ad are in Basic. They are full featured, fully plotted adventures that will take a minimum of thirty hours (in several sittings) to play.

Adventuring requires 16k on Sinclair, TRS-80, and TRS-80 Color. They require 8k on OSI and 13k on VIC-20. Sinclair requires extended BASIC.

**TREK ADVENTURE** by Bob Retelle — This one takes place aboard a familiar starship and is a must for trekkies. The problem is a familiar one — The ship is in a "decaying orbit" (the Captain never could learn to park!) and the engines are out (You would think that in all those years, they would have learned to build some that didn't die once a week). Your options are to start the engine, save the ship, get off the ship, or die. Good Luck.

Authors note to players — I wrote this one with a concordance in hand. It is very accurate — and a lot of fun. It was nice to wander around the ship instead of watching it on T.V.

**CIRCLE WORLD** by Bob Anderson — The Alien culture has built a huge world in the shape of a ring circling their sun. They left behind some strange creatures and a lot of advanced technology. Unfortunately, the world is headed for destruction and it is your job to save it before it plunges into the sun!

Editors note to players — In keeping with the large scale of Circle World, the author wrote a very large adventure. It has a lot of rooms and a lot of objects in them. It is a very convoluted, very complex adventure. One of our largest. Not available on OSI.

**HAUNTED HOUSE** by Bob Anderson — This one is for the kids. The house has ghosts, goblins, vampires and treasures — and problems designed for the 8 to 13 year old. This is a real adventure and does require some thinking and problem solving — but only for kids.

Authors note to players — This one was fun to write. The vocabulary and characters were designed for younger players and lots of things happen when they give the computer commands. This one teaches logical thought, mapping skills, and creativity while keeping their interest.

**DERELICT** by Rodger Olsen and Bob Anderson — For Wealth and Glory, you have to ransack a thousand year old space ship. You'll have to learn to speak their language and operate the machinery they left behind. The hardest problem of all is to live through it.

Authors note to players — This adventure is the new winner in the "Toughest Adventure at Aardvark Sweepstakes". Our most difficult problem in writing the adventure was to keep it logical and realistic. There are no irrational traps and sudden senseless deaths in Derelict. This ship was designed to be perfectly safe for its' builders. It just happens to be deadly to alien invaders like you.



**NUCLEAR SUB** by Bob Retelle — You start at the bottom of the ocean in a wrecked Nuclear Sub. There is literally no way to go but up. Save the ship, raise her, or get out of her before she blows or start WWII.

Editors note to players — This was actually plotted by Rodger Olsen, Bob Retelle, and someone you don't know — Three of the nastiest minds in adventure writing. It is devious, wicked, and kills you often. The TRS-80 Color version has nice sound and special effects.

**EARTHQUAKE** by Bob Anderson and Rodger Olsen — A second kids adventure. You are trapped in a shopping center during an earthquake. There is a way out, but you need help. To save yourself, you have to be a hero and save others first.

Authors note to players — This one feels good. Not only is it designed for the younger set (see note on Haunted House), but it also plays nicely. Instead of killing, you have to save lives to win this one. The player must help others first if he/she is to survive — I like that.

*Please specify system on all orders*

**PYRAMID** by Rodger Olsen — This is one of our toughest Adventures. Average time through the Pyramid is 50 to 70 hours. The old boys who built this Pyramid did not mean for it to be ransacked by people like you.

Authors note to players — This is a very entertaining and very tough adventure. I left clues everywhere but came up with some ingenious problems. This one has captivated people so much that I get calls daily from as far away as New Zealand and France from bleary eyed people who are stuck in the Pyramid and desperate for more clues.

**QUEST** by Bob Retelle and Rodger Olsen — THIS IS DIFFERENT FROM ALL THE OTHER GAMES OF ADVENTURE!!!! It is played on a computer generated map of Alesia. You lead a small band of adventurers on a mission to conquer the Citadel of Moorlock. You have to build an army and then arm and feed them by combat, bargaining, exploration of ruins and temples, and outright banditry. The game takes 2 to 5 hours to play and is different each time. The TRS-80 Color version has nice visual effects and sound. Not available on OSI. This is the most popular game we have ever published.

**MARS** by Rodger Olsen — Your ship crashed on the Red Planet and you have to get home. You will have to explore a Martian city, repair your ship and deal with possibly hostile aliens to get home again.

Authors note to players — This is highly recommended as a first adventure. It is in no way simple—playing time normally runs from 30 to 50 hours — but it is constructed in a more "open" manner to let you try out adventuring and get used to the game before you hit the really tough problems.



**ADVENTURE WRITING/DEATHSHIP** by Rodger Olsen — This is a data sheet showing how we do it. It is about 14 pages of detailed instructions how to write your own adventures. It contains the entire text of Deathship. Data sheet - \$3.95. NOTE: Owners of OSI, TRS-80, TRS-80 Color, and Vic 20 computers can also get Deathship on tape for an additional \$5.00.

## PRICE AND AVAILABILITY:

All adventures are \$14.95 on tape except Earthquake and Haunted House which are \$9.95. Disk versions are available on OSI and TRS-80 Color for \$2.00 additional.

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# Racing Toward Perfection

## Info Utilities Getting Along Swimmingly

Good news in the world of information utilities—the Source has a strong new lease on life and CompuServe has finally developed an on-line encyclopedia. I'll tell you about the Source's new computer center in just a few moments, but first let's talk about communications software and examine a useful host package—Hostcomm—for the the IBM PC.

### "New Wave" Software

"New Wave" has been used to describe rock music, art and literature. I suggest we also classify software and computer systems coming into the market as "new wave."

The new wave systems include the Grid, Fortune and new Epson machines. These computer systems provide software packages integrated together with common files, commands and screen formats. They take another step in reducing the "computereze" needed to use a microcomputer system. The heavily-publicized 1-2-3 business package for the IBM PC is an example of new wave software for an established system.

We have yet to see much of the "keep it simple, stupid" philosophy in data communications software. Most smart terminal programs still need to be guided by either the entry of mumbo-jumbo commands or the selection of a choice from a menu full of technical phrases. In either case, a keyboard has to be used to make the entry and the results appear as printed text on the screen.

People understand pictures and diagrams much more quickly and with less effort than they understand printed words. And many of the systems available today have an excellent capability for displaying graphics. Will the next person who writes a communications package for the IBM PC, any of the PC work-

alikes (e.g., DEC Rainbow, Zenith), or any Apple computer please take these factors into account?

Instead of words and command prompts, put a few diagrams on the screen. One screen might include a diagram of a personal computer on the left and several other kinds of systems on the right.

The user would simply put a cursor over the symbol for the desired system and the software would load the correct communications protocols and telephone numbers. Cursor positioning could be done with arrow keys, a lightpen or a "mouse." (A mouse is a cursor-positioning device that runs over the desktop and interacts with the screen.)

The word Connect? would then appear on the screen and, if the user acknowledged, the connection and log-on would be accomplished. Similar screens would be used to get a file from the distant system, transmit a file and select choices from the services of information utilities. These screens could use graphic representations of paper files and documents in the style of the Xerox Star.

The moveable cursor or light pen should be able to transmit commands to an information utility. The software in the desktop system will know the proper commands, or the sequence of commands will make the action happen.

It is an obvious but seldom-appreciated fact of life that to be loved you have to be loveable. If you want your software to sell, you have to provide it with not just friendly but "loveable" qualities. Be creative, use graphics and help to generate a new wave in user software.

### Hostcomm for the PC

Would you like to have access to your IBM PC when you're away from home? Do you need a message system or remote computing capability for your business or school? If so, Hostcomm, written by Janadon Software and distributed and supported by N.F. Systems in Atlanta,

can help.

Hostcomm is not a complete electronic bulletin board. It *could* serve as the basis of a sophisticated bulletin board, but the Hostcomm package doesn't include the programs needed to categorize, sort and file messages going between a large number of users. It focuses on the ability of the system operator to exchange information with specific users and for users with proper passwords to access disk files and run programs.

Hostcomm can interface with a Hayes Smartmodem to answer a ringing telephone line and greet the caller. The program will ask the caller for identification and a password. If the caller has mail from the system operator, the software will automatically deliver it.

Hostcomm can grant five levels of access. Persons with certain passwords are given access only to specific files and functions. This multi-level approach provides a flexible system for use in various business and academic situations.

The package is easy to set up and can be used on an IBM PC with 96K of RAM and a single 320K disk drive, but a dual-drive system is desirable. The main program is compiled, so it's not easily changed, but the utility programs are in Basic and they can be used to change the look and function of the system.

I have used Hostcomm both as a system operator and as a caller. It's reliable and friendly and I recommend it highly. The complete software package sells for \$139.95. Contact NF Systems, PO Box 76363, Atlanta, GA 30358 (or call 404-252-3303), for more information.

### Source and CompuServe: A New Race

Before I dive into this subject, I'd like to wring out an analogy one more time. I have often compared Source and CompuServe to two swimmers competing in a race. CompuServe has a steady stroke and good style. The Source has been wild and erratic. Source has often splashed

Address correspondence to Frank J. Derfler, Jr., PO Box 691, Herndon, VA 22070.



frantically and sometimes nearly disappeared from sight.

A few months ago, I wrote that the Source had attempted to change strokes and run into the side of the pool. Well, you had better sit up in the bleachers and watch, because there's a whole new race going on.

The Source literally hit the wall when its creators attempted to change to a new electronic mail system. The mail service became useless and the management gave many users a small rebate for their trouble and frustration. But this experience taught them a lesson.

Their next step was not just to change strokes, but to pull their sodden slugger out of the pool for a rest and to send in a swimmer who is a bigger and stronger fraternal twin of the original. This swimmer is now churning the water with a powerful and steady stroke and has caught the attention of the crowd. The CompuServe team, however, is not asleep; they just tossed their boy swimfins.

### A New Home for the Source

Many of the technical problems experienced by users of the Source were caused by the company's reliance on a time-sharing service located 50 miles away from their corporate headquarters. The physical distance and dependence on leased computers did little to improve the quality of the service provided to the Source users.

When the *Reader's Digest* people took over the Source, they knew they would have to do something to improve reliability. Their response was to start putting together their own computer center just down the street from the corporate headquarters. The gurgles and splashes experienced last August were actually the first moves toward this new dedicated operation.

I was there when the governor of Virginia opened the new Source Computer Center last October. The new center makes a tremendous amount of computing power available to you when you use the Source.

There are nine Prime 750 computers dotting the floor of the 6100-square foot facility. These computers are networked together to perform all of the communications and data retrieval functions. One of the nine computers is designated as a ready spare. The center has power feeders from the local power company, its own uninterruptible power supply and a diesel generator for backup.

If you like computer hardware, you can appreciate the image of 19 300-megabyte hard disks holding data for you. That's slightly less than six gigabytes of memory! The new computer center can accept 500 subscribers at one time. With average usage rates, that's enough capacity to support a population base of 250,000 subscribers.

The Source Telecomputing Corp. has



One of the nine Prime 750 computers in the new Source Computer Center. The stuffed toys on each machine are used to identify a specific system instead of numbers... as in, "Please go hang a new backup tape on the giraffe."

already invested more than five million dollars in computer hardware. Since hardware is usually much less than 50 percent of the cost of a computer installation, the company has made a significant investment to provide reliable service to its users.

I've used the "new" Source frequently during the past few months and the improvements in speed and reliability certainly are apparent. The Source now has a smooth and powerful stroke.

### CompuServe Adds Features

The folks at CompuServe have not been dead in the water. They've done a nice job of providing a service I've been pushing for a long time: an encyclopedia. In my mind, an information utility must have an on-line encyclopedia just as a family automobile must have a back seat.

CompuServe has installed one of the best back seats possible in the form of the *World Book Encyclopedia*. This is the complete *World Book*, with 31,000 subjects and 10 million words of text. I think the electronic version is easier and much faster to use than the print version. Considering the cost of the original print version and its updates, the CompuServe electronic version is a whole lot cheaper, too.

The CompuServe format allows you to make subject searches quickly. You are shown the alternatives and allowed to redefine your search. The whole process is well-planned and I think CompuServe has added a feature that, like a back seat in an auto, no service should be without. This *World Book* reference can be valuable to home and business subscribers.

The CompuServe *World Book* feature includes a section for trivia and quizzes (the *World Book Challenge*), flashbacks featuring current news tied with history



Each computer has two of these 300-megabyte disk drives. The systems each have about three megabytes of internal memory.

and a look at "what happened on this day in history." The *World Book* service is available at the regular CompuServe hourly service rates.

### Better E-Mail

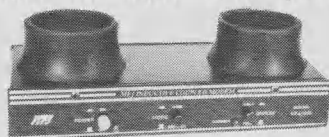
If an on-line encyclopedia is the back seat of the information sedan, an electronic mail system is the passenger seat. It allows you to share the ride with others and gives you someone to talk to along the way.

CompuServe has made a slight improvement to their electronic mail service by increasing maximum message



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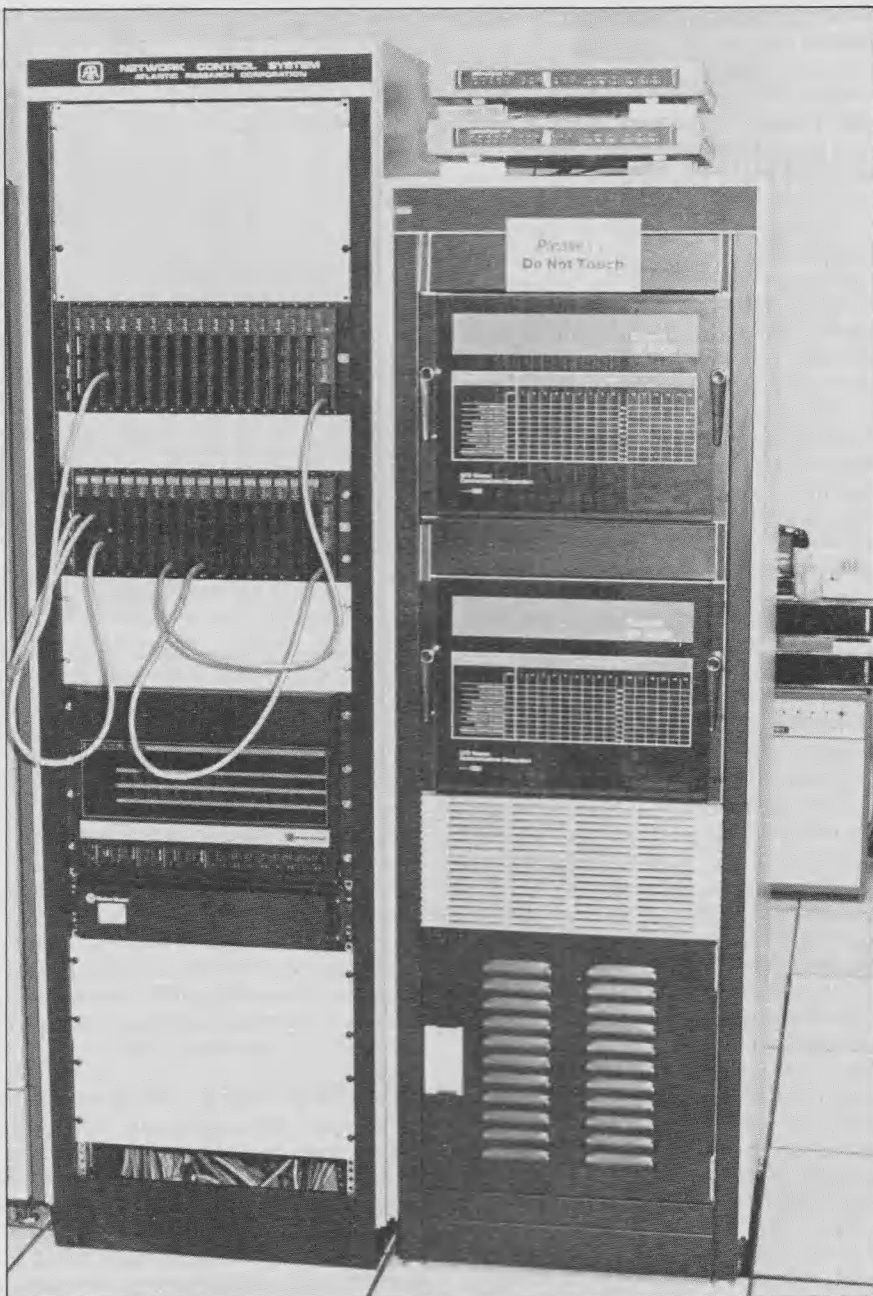
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If you use Telenet to reach the Source, your call will come in through one of these Telenet multiplexers. These two racks are part of a large communications termination center. Five hundred subscribers can enter through the telecommunications facilities at one time to use the power of the Source.

size from 2000 to 4000 characters. This makes the service more useable for transmitting articles and multipage business documents. CompuServe has done nothing to improve the rest of this relatively primitive mail service.

The addition of the ability to easily answer received messages would be a great improvement. The present system forces you to file or delete the received message and then work your way through a couple of menus in order to write a reply. I've often found that making a polite response to a CompuServe E-Mail message simply isn't worth the effort.

Source's passenger seat, by contrast, is a joy to use. Their electronic mail is now warm, friendly and efficient. Now that

their sedan is running well, they need only to put in a back seat and they might get some riders!

## Mixing Analogies

I hope you'll forgive my mixed medley of fast-track analogies, but I'm trying to make a point. Neither information utility is perfect yet, but they are much closer now than ever before.

If you haven't subscribed to an information utility yet, now might be the time to consider sampling their power. You can call CompuServe at 800-848-8990. The number for the Source is 800-336-3330. When you sign on, drop me a note at TCB967 on the Source or 70003,455 on CompuServe. □



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# LETTERS TO THE EDITOR

## Tomorrow's House Today

The "Intelligent Toaster" column by Mark Robillard (*Microcomputing*, Nov. '82, p. 46) was especially interesting to my company since we already have a home control system on the market called *TomorrowHouse*. We do much of what Mr. Robillard speculates will be done by microcomputers in the future. We stress practical functions, especially security and energy management, with a bit of convenience and luxury thrown in.

Mr. Robillard describes my existing security system almost exactly, except *TomorrowHouse* adds temperature monitoring and other inputs to the perimeter alarm. This way, if your refrigerator "loses its cool," *TomorrowHouse* activates the autodialer on an auxiliary channel.

We're working on an extension now whereby *TomorrowHouse* will also dial

the phone and give a voice message to you at your office, or to a neighbor, etc. You could also call in to check on things or turn on the toaster (or better yet, the hot tub).

Besides various enhancements to version 1.1, the new system (made possible by use of a RAM card) will permit any analog or digital input to control any relay, TTL or AC output via a user-defined schedule—perfect for improving the performance of solar-heating systems.

**Russ Coffman**  
Compu-Home Systems, Inc.  
Denver, CO

## Can It Be Done?

I am one of the many Atari 400 owners now learning some of the features we don't have on the 400 that are standard

on the 800. The 16K RAM limited us for a while, then came the memory add-ons (I'm now running with 32K, and satisfied—for now).

What I'd like is to be able to run a color monitor from my 400 (the 800 still costs too much, and I can live with the membrane keyboard).

Atari dealers indicate that other people have asked about the same thing, but no one that they know has done it yet. It seems the interest does exist.

I realize that it's more of a project than just adding a video amplifier stage. It appears that many of the signals are absent (or haven't been developed) in the standard 400 assembly. But, my question is still: *Can it be done?*

If not, what brand and size of color TV should be used as a substitute for a monitor (to be used on a desk)?

Any help will be greatly appreciated.

**Allan M. Schwartz**  
57724 Riverdale Road, #1-5  
College Park, GA

## Can You Top This?

As a follow-up to my previous letter, I would like to demonstrate what the IBM Personal Computer can do when an 8087 chip is installed. The language used is Polyforth 2 from Forth, Inc. This version of Forth uses the 8087-register stack as an additional Forth stack. This efficient use of the 8087 architecture should make this chip-language combination almost unbeatable for speed.

I have submitted two benchmark programs. Both operate on 64-bit floating-point numbers. The first is the popular shell sort mentioned in previous issues (Listing 1). The second is a matrix inversion (Listing 2). I have also included a Basic listing of the matrix inversion for comparison (Listing 3).

The shell sort took an average of 8.8 seconds for 500 numbers; the matrix inversion took 0.692 seconds for a tenth order matrix. These 8087-supported Forth programs show speeds 30 and 35 times greater than the speeds of their non-8087-supported Basic counterparts.

Are there any C language users with 68000-based computers who can beat these benchmarks?

**Steven A. Ruzinsky**  
Cicero, IL

```
0 ( 8087 Polyforth Shell Sort ) : TASK ; 185 LOAD
1 1000 4ARRAY A L V A R I A B L E T T
2 : RNDA 0.0 TT L! N@ 0 DO 1.0 TT L@ F+ TT L! TT L@ RND F* I
3   A L! LOOP ;
4 : A. N@ 0 DO CR I A L@ N. LOOP ;
5 : SORT N@ K! BEGIN K@ 1+ 2 / K! BEGIN I
6   N@ K@ - 0 DO I A L@ I K@ + A L@ F>
7   IF I A I K@ + A LEXC DROP 0
8   THEN LOOP UNTIL K@ 1 > NOT UNTIL ;
9 : TEST-10X ." How Many Numbers ? " #IN N! CR 10 0 DO CR RNDA
10  START SORT T. LOOP ;
11
12
13
14
15
0 ( Predefined Operators for Matrix Inversion )
1 30 N! N@ N@ L M A T R I X A1 N@ N@ L M A T R I X A2 L V A R I A B L E T T
2 : A1. N@ 0 DO ." Row " I . CR N@ 0 DO ." a1( " J . . " , " I .
3   ." ) = " J I A1 L@ N. CR LOOP LOOP ;
4 : A2. N@ 0 DO ." Row " I . CR N@ 0 DO ." a2( " J . . " , " I .
5   ." ) = " J I A2 L@ N. CR LOOP LOOP ;
6 : ORDER ." Matrix Order, N = ? " #IN N! CR ;
7 : A1! N@ 0 DO ." Row " I . CR N@ 0 DO ." a1( " J . . " , "
8   I . . " ) = " IN# J I A1 L! CR LOOP LOOP ;
9 : RNDA N@ 0 DO N@ 0 DO RND J I A1 L! LOOP LOOP ;
10 CODE T! R64 TT FSTP NEXT
11 CODE T@ R64 TT FLD NEXT
12
13
14
15
0 ( 8087 Polyforth Matrix Inversion )
1 : TASK ; 185 LOAD 186 LOAD
2 : INIT N@ 0 DO N@ 0 DO I J = IF 1.0 ELSE 0.0 THEN I J A2 L!
3   LOOP LOOP ;
4 : LP12 DUP J! N@ SWAP DO I K! I J@ A1 L@ F0= NOT IF LEAVE THEN
5   LOOP N@ 0 DO J@ I A1 K@ I A1 LEXC J@ I A2 K@ I A2 LEXC
6   LOOP J@ J@ A1 L@ 1/N
7   N@ 0 DO J@ I A1 S-1 J@ I A2 S-1 LOOP FDROP ;
8 : INV INIT N@ 0 DO I LP12
9   N@ 0 DO I J = NOT IF I J A1 L@ FNEGATE J K!
10  N@ 0 DO K@ I A1 J I A1 S-2 K@ I A2 J I A2 S-2
11  LOOP FDROP THEN LOOP LOOP ;
12 : TEST RNDA START INV T. CR ;
13
14
```

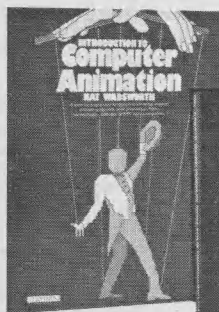
Listing 1. Shell sort written in Polyforth 2 using the 8087 chip.



# New for the New Year

## #6279 Introduction to Computer Animation

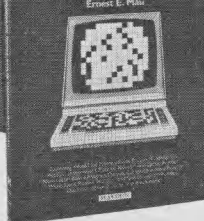
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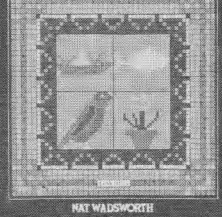
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## Who Needs Computer Literacy?

Computer literacy is a myth. There is no such thing. Many articles have been written decrying the lack of computer literacy in our society. Thousands of books and college courses have been devoted to this subject, but it really doesn't exist.

Why? Because computers are not literate. In fact, computer operators need not be literate either (though knowing how to

read is advantageous).

Like the telephone, computers are machines and are quite easy to operate. You just turn them on and follow the instructions as they appear on the screen. You don't hear about telephone literacy. Computers are the same thing—no problem.

A properly functioning computer with quality software is a pleasure. Where we get into trouble is when we have software or hardware malfunctions which screw up the works.

Just like the early telephones, which

had a lot of hardware and software problems, computers (still in their evolutionary infancy) have often given us interesting moments. In time, computers will become a rare annoyance... just like the telephone.

So why all the talk about computer literacy? It is due to the desire of our news and education industries to increase their power. The news media tells you that you're dumb, stupid, and you will fall behind or lose a job because you are a computer illiterate.

This makes people nervous and they buy more books, papers and magazines in an effort to catch up. Education, suffering from the exit of all those baby-boom people, needs more bodies to maintain income and justify their share of tax revenues.

Certainly we need programmers and systems analysts who are well-trained in computer technology... just like all the telephone repairmen and installers who must be trained for their trade. But for the rest of us consumers, all we do is turn computers on and use them... just like the telephone... and that requires very little "literacy."

**E.J. Neiburger**  
Waukegan, IL

```

0 ( Words for Both Sort and Matrix Inversion )
1 : REM 1.0 FROT FROT F/ PREM FSWAP FDROP ;
2 : LARIABLE RNDV 12345.0 RNDV L!
3 : RND RNDV L@ 24298.0 F* 99991.0 F+ 199017.0 REM FDUP 199017.0
4 : F* RNDV L! ;
5 : 4ARRAY CREATE B * 10 + ALLOT ;CODE W INC W INC 1 POP 1 SHL
6 : 1 SHL 1 SHL W 1 ADD 1 PUSH NEXT
7
8
9
10
11
12
13
14
15
0 ( Special Assembly Defined Operators )
1 CODE LEXC W POP R64 W ) FLD W O MOV W POP R64 W ) FLD
2 W O XCHG R64 W ) FSTP O W MOV R64 W ) FSTP NEXT
3 CODE LMUL O POP W POP R64 W ) FLD O W MOV R64 W ) FMUL
4 R64 W ) FSTP NEXT
5 CODE LADD O POP W POP R64 W ) FLD O W MOV R64 W ) FADD
6 R64 W ) FSTP NEXT
7 CODE LMAD O POP W POP R64 W ) FLD W POP R64 W ) FMUL
8 O W MOV R64 W ) FADD R64 W ) FSTP NEXT
9 CODE S-2 O N) FLD O POP W POP R64 W ) FMUL O W MOV
10 R64 W ) FADD R64 W ) FSTP NEXT
11 CODE S-1 O N) FLD W POP R64 W ) FMUL R64 W ) FSTP NEXT
12
13
14
15
0 ( Variables and Words for Both Sort and Matrix Inversion )
1 180 LOAD 182 LOAD LONG 16 FIX
2 VARIABLE JJ CODE J! O POP O JJ MOV NEXT
3 CODE J@ JJ O MOV O PUSH NEXT
4 VARIABLE KK CODE K! O POP O KK MOV NEXT
5 CODE K@ KK O MOV O PUSH NEXT
6 VARIABLE N CODE N! O POP O N MOV NEXT
7 CODE N@ N O MOV O PUSH NEXT
8 VARIABLE H CODE H! O POP O H MOV NEXT
9 CODE H@ H O MOV O PUSH NEXT
10 VARIABLE II CODE I! O POP O II MOV NEXT
11 CODE I@ II O MOV O PUSH NEXT
12 VARIABLE M CODE M! O POP O M MOV NEXT
13 CODE M@ M O MOV O PUSH NEXT
14 : T. COUNTER SWAP - >N 1000.0 F/ 3 F. ." sec." ;

```

Listing 2. Matrix inversion written in Polyforth 2 using the 8087 chip.

```

100 ' Matrix Inversion ( 24 seconds for 10th order matrix )
    For manual input, delete lines 130, 160, and 250
110 DEFDBL A-Z:DEFINT I,J,K,N
120 INPUT "Enter Matrix Order, N = ???":N:DIM A1(N,N), A2(N,N)
130 FOR I=1 TO N:FOR J=1 TO N:A1(I,J)=RND:NEXT J,I:GOTO 160
140 PRINT "Enter Matrix, A(N,N) :":FOR I=1 TO N:PRINT "Row":I:FOR J=1 TO N:PRINT
    "A(";I;",";J;") = ":INPUT A1(I,J):NEXT J,I
150 ' Begin Inversion
160 TIME# = "0"
170 FOR I=1 TO N:A2(I,I)=1:NEXT
180 FOR K=1 TO N:FOR J=K TO N:KK=J:IF A1(J,K)<>0 THEN 190 ELSE NEXT
190 FOR J=1 TO N:SWAP A1(K,J),A1(KK,J):SWAP A2(K,J),A2(KK,J):NEXT
200 TT=1/A1(K,K):FOR J=1 TO N:A1(K,J)=TT*A1(K,J):A2(K,J)=TT*A2(K,J):NEXT
210 FOR J=1 TO N:IF J=K THEN 240
220 TT=-A1(J,K)
230 FOR I=1 TO N:A1(J,I)=A1(J,I)+TT*A1(K,I):A2(J,I)=A2(J,I)+TT*A2(K,I):NEXT
240 NEXT J,K
250 PRINT TIME#:END
260 ' End Inversion
270 PRINT "Inverse of Matrix, A(N,N) :":FOR I=1 TO N:PRINT "Row" I:FOR J=1 TO N:
    PRINT "A(";I;",";J;") = ":A2(I,J):NEXT J,I:END

```

Listing 3. Basic listing of the matrix inversion.

## S & M Is Faster

If I read David Vergin's article "Bubble Sort with Sinkers" (*Microcomputing*, October '82, p. 68) correctly, the sort given in Fig. 3 is nothing more or less than the final stage of the Shell-Metzner sort.

The S & M sort starts out comparing the top half of the file with the bottom half. Then it divides the halves in half and compares each quarter against its neighbor. Then another division and comparison is made. Each time a swap is made, the test drops back down (sinks) and compares again.

When no further swap is made, the test jumps back up to where it was before the first swap. In the final pass, each item is compared to the one next to it—exactly like Fig. 3. The true Shell-Metzner sort isn't that much harder to write and is much faster. Sorting 88 strings in reverse order using bubble with sinkers (in Basic) took two minutes and six seconds on my computer; the same items using S & M took 24 seconds. I'll take S & M any day!

**Bill White**  
Homestead, FL

Reply:

A number of people have correctly identified the "Bubble Sort with Sinkers" as a standard version of the insertion sort, although by that name it is understood in a slightly different way. I am interested in the Shell-Metzner



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method Bill White describes—none of my resources list it.

One question: how are chunks of a file to be compared to each other? (I can imagine a couple of possible ways.)

Whether or not sorting records in random order would result in the kind of gain Bill reports, I cannot say; sorting from reverse order is the absolute worst case for the bubble-sinker sort (as it may be for S & M).

Bill and I agree that readers should be encouraged to try sorting techniques other than the standard bubble sort. Many options are not much more complicated and the gains can be considerable.

**David Vergin**  
Milton, WA

### A Good Article, But . . .

I can see why Linda McKinnon's article, "A Best-Selling Program," in the November 1982 issue of *Microcomputing* (p. 69), would be popular. With a few modifications it can be used for a number of applications. However, to use the Edit feature I had to change line 3103

from: 3103 IF N(EDIT) <>N(I) THEN 3340  
to: 3103 IF N(EDIT) <>N(I) THEN 3360

I also found that the input statements 2060 and 3060 in the Delete and Edit subroutines are not necessary. Once these corrections were made, the program ran flawlessly.

**Clyde Landrum**  
South Bend, IN

Reply:

Changing line 3103 from IF N(EDIT) <>N(I) THEN 3340 to IF N(EDIT) <>N(I) THEN 3360 will give incorrect results since the Sort key is the author's name. (AUS(I)). In a binary tree structure such as this, the left side of the node represents authors' names "less than" the node itself and the right side represents names "greater than" the node.

If line 3103 is changed as suggested, we search only the right side of the tree and never find the author if his name belongs in the left branch. Following this strategy, it is also necessary to keep lines 2060 and 3060 to retain the Sort keys (author). If lines 2060 and 3060 are deleted, the pointers in the structure are rearranged and several records of the database are lost!

If the program is used for another application which doesn't need the Sort

key, it is conceivable that the suggested modifications could be useful.

**Linda McKinnon**  
Manchester, NH

### Ooops . . .

Much to my chagrin I have discovered a flaw in the logic used to develop the program described in "Apple Magic VisiCalc Formulas" (*Microcomputing*, November '82, p. 62). On page 64 the first sentence of the fourth paragraph reads "Line 252 stores the coordinates of the first VisiCalc cell read since it is the highest numbered cell."

Unfortunately, the first cell is not always the highest numbered cell, as I discovered after trying to print out a VisiCalc model. Rather, the first cell read is the rightmost cell from the last row stored.

On the bright side, the correction is easy.

Change line 252 to read:

252 IF col>ncol THEN ncol = col

Add line 253 to read:

253 IF row>nrow THEN nrow = row

**Justin Crom**  
Denver, CO

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# Micro Software Digest

Compiled by Swain Pratt

*Micro Software Digest presents a collection of capsulized software reviews from various computer-related publications. Micro Software Digest is presented in an index-card format; so read on and clip and keep your favorites.*

## Z80

### Client Ledger System

**System Requirements:** 8080, 8085 or Z80 system, CP/M, 48K minimum (64K recommended), dual, eight-inch, single-density disk drives, 132-column printer

**Manufacturer:** TCS Software, Inc., 3209 Fondren Road, Houston, TX 77063

**Price:** \$2000

**Comments:** Particularly useful for public accountants, Client Ledger System, says the review, "permits you to use one general ledger system for the general ledgers for several different businesses... (it) contains all the functions you need to prepare monthly, quarterly and year-end balance sheets, trial balances and profit-and-loss statements."

Although it is not speedy, says the review, "this is an excellent program, useful to a bookkeeper or accountant who provides services to other businesses."

Reader Service Number 413

*(Reviewed in InfoWorld, November 1, 1982)*

## Z80

### Datebook

**System Requirements:** Z80-based system, CP/M 2.1, 58K RAM, dual eight-inch single-density disks, 80×24 terminal

**Manufacturer:** Digital Marketing, 2670 Cherry Lane, Walnut Creek, CA 94596

**Price:** \$295

**Comments:** According to the review, "Datebook is a program that provides a microcomputer with the automated equivalent of an office appointment book and calendar. It is designed specifically for physicians and attorneys, but it may well satisfy other office time-management requirements."

Datebook, states the review, is a flexible program which can handle appointment and meeting schedules for quite a number of people in a busy office.

Reader Service Number 412

*(Reviewed in InfoWorld, October 18, 1982)*

## COMMODORE

### VIC Turtle Graphics

**System Requirements:** Commodore VIC 20

**Manufacturer:** Human Engineered Software, 71 Park Lane, Brisbane, CA 94005

**Price:** \$39.95

**Comments:** VIC Turtle Graphics, according to the review, "is a plug-in cartridge that overrides the resident Commodore VIC Basic interpreter. A user-defined character, called the turtle, traces its way across the screen, drawing pictures according to commands in a stored program."

Turtle Graphics is a Logo language feature, aimed at helping children learn the basics of programming. "It is not only easy and versatile," says the review, "but it is also a true programming environment, with command structure and syntax similar to more 'mature' systems."

Reader Service Number 416

*(Reviewed in InfoWorld, November 22, 1982)*

## HEATH/ZENITH

### Spool-n-Go

**System Requirements:** Heath/Zenith H-89/Z-89/Z-90 or H-8 computer, HDOS, 32K RAM, one 5¼-inch disk drive (two recommended), printer

**Manufacturer:** The Software Toolworks, 14478 Glorietta Drive, Sherman Oaks, CA 91423

**Price:** \$29.95

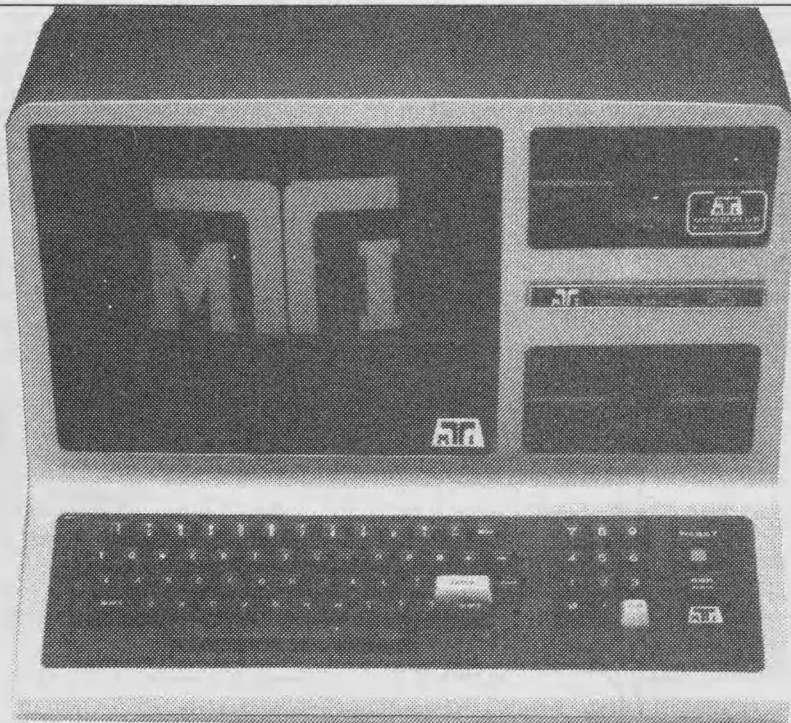
**Comments:** The review explains that a spooler is a program which allows you to continue to use your computer while printing. "Spool-n-Go," says the review, "is essentially a time-sharing system. It steals small amounts of time from your computer to drive your printer."

This is possible because the computer works much faster than you can input or your printer can print. "Spool-n-Go not only does a good job but does it unobtrusively," concludes the review.

Reader Service Number 414

*(Reviewed in InfoWorld, November 29, 1982)*





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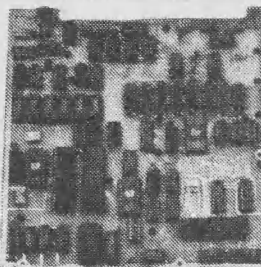
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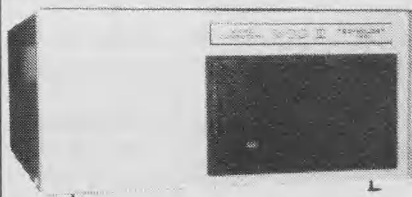
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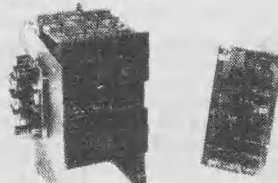
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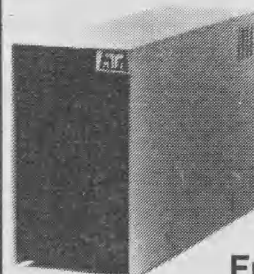
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## APPLE

### How to Operate the Apple II Plus

**System Requirements:** Apple II, 48K, ROM Applesoft, one disk drive

**Manufacturer:** FlipTrack Training Tapes, 526 North Main St., Box 711, Glen Ellyn, IL 60137

**Price:** \$49.95

**Comments:** "Assuming absolutely no knowledge of the Apple," says the review, "How to Operate the Apple II Plus is a set of three audio cassette tapes containing about five hours of instruction on loading, running, saving, copying, protecting, modifying, calculating, and virtually any other non-programming function that can be performed on an Apple."

According to the review, this is a very good program for school or business use, for "it leaves your eyes and concentration free for the screen and the keyboard."

Reader Service Number 410

*(Reviewed in Softalk, November, 1982)*

## APPLE

### Fred III

**System Requirements:** Apple II with 48K, ROM Applesoft, one disk drive

**Manufacturer:** Creative Mind Workshop, Box 3017, Columbus, OH 43210

**Price:** \$30

**Comments:** According to the review, "Fred is an extremely user-friendly program that allows you to set up to thirty budget categories and twelve savings or investment accounts per data disk. . . Fred allows the user to see what bills are due, the total amount still owed, the current monthly payment due and the date the payment is due."

"Fred is a good money management program," concludes the review, "that could be ideally suited to the needs of small clubs, organizations, or small businesses that need a tool for tracking accounts payable and cash on hand."

Reader Service Number 409

*(Reviewed in Softalk, November, 1982)*

## APPLE

### Sensible Speller

**System Requirements:** Apple II with 48K, ROM Applesoft, one disk drive

**Manufacturer:** Sensible Software, 6619 Perham Drive, West Bloomfield, MI 48033

**Price:** \$125

**Comments:** According to the review, Sensible Speller is "the most comprehensive dictionary yet available for the Apple" containing a "vocabulary of seventy-five thousand words."

"This spelling verification program," continues the review, "works with most word processing packages available for the Apple." It also, says the review, tabulates the number of words used in a text.

"Sensible Speller," concludes the review, "is a topnotch professional package that belongs on your desk if you're involved in word processing."

Reader Service Number 401

*(Reviewed in Softalk, November, 1982)*

## APPLE

### Honinbo Warrior

**System Requirements:** Apple II with 48K ROM Applesoft, one disk drive

**Manufacturer:** Mark Watson, 535 Mar Vista, Solana Beach, CA 92075

**Price:** \$21

**Comments:** Honinbo Warrior is a program which allows you to play go, the Chinese/Japanese board game, with your Apple. Go is similar to chess in aim, but the pieces are undifferentiated. "Now," says the review, "you can learn the basic patterns of play and experiment with them to your heart's content, with a tireless sparring partner."

The game is available only from the author, Mark Watson, and is protected by the fact that your name is written permanently into the program when you buy it, according to the review. There is no manual, but, concludes the review, "system operation is so simple that you don't really need a book with this one—except, of course, a good book on go, which you get on your own."

Reader Service Number 403

*(Reviewed in Softalk, November, 1982)*

## APPLE

### Prism

**System Requirements:** Apple II with 48K, ROM Applesoft, one disk drive

**Manufacturer:** International Software Marketing (ISM), Suite 421, University Building, 120 East Washington St., Syracuse, NY 13202

**Price:** \$19.95

**Comments:** Prism is a fairy-tale game. "The tale," says the review, "is woven around the adventures of a young boy, Hubert, as he strives to recover the three stolen 'keys of color'."

"The story," continues the review, "is told in text and thoroughly illustrated in hi-res panels with some very slick animation." According to the review, an actual treasure hunt is coupled with this game. ISM, the manufacturer, has hidden three gold and jeweled keys in three locations within the continental United States, the program contains clues to these locations, and finders are keepers.

"Only when the three keys are physically united with the prism, which resides at ISM, will the conclusion to the Prism story unfold," concludes the review.

Reader Service Number 404

*(Reviewed in Softalk, November, 1982)*

## APPLE

### Arcade Machine

**System Requirements:** Apple II with 48K, ROM Applesoft, one disk drive

**Manufacturer:** Broderbund Software, 1938 Fourth St., San Rafael, CA 94901

**Price:** \$44.95

**Comments:** Arcade Machine is a program with which you can create your own games, but not without work. "Even though you need no programming knowledge," says the review, "using the Arcade Machine requires that you learn quite a bit about the way graphic games are constructed."

According to the review, the manual is not sufficiently detailed and the program does not provide for creating maze games, but, concludes the review, "it's a lead-pipe cinch you'll never get more for your money—or for your effort."

Reader Service Number 402

*(Reviewed in Softalk, November, 1982)*

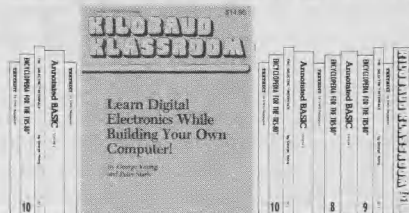
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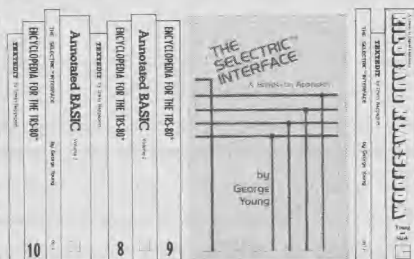
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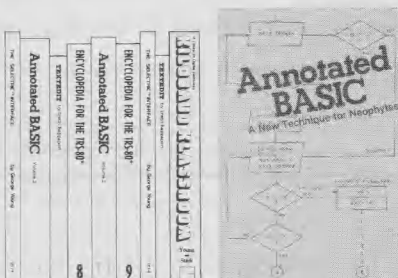
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**APPLE****Net-Works II, Version 2.2**

**System Requirements:** Apple II Plus, DOS 3.3, 48K RAM, one disk drive minimum, D.C. Hayes Micromodem II

**Manufacturer:** Advanced Data Systems, 7468 Maple Ave., St. Louis, MO 63143

**Price:** \$139 (\$75 on sale)

**Comments:** "If you always thought that the Source or CompuServe was based on a nifty idea, this program is for you," says the review. This program gives the modem-equipped Apple access to electronic mail, public bulletins and other features.

According to the review, Net-Works "is an extremely easy-to-use program, both from the standpoint of the system operator and of the system users." The review warns that you can all too easily run up a big phone bill and be burdened by the responsibilities of a system operator if you become addicted.

Reader Service Number 417

(Reviewed in InfoWorld, November 22, 1982)

**APPLE****Accu-Shapes**

**System Requirements:** Apple II, DOS 3.3, 48K RAM, one 5¼-inch disk drive, Color monitor or TV recommended

**Manufacturer:** Accent Software, 3750 Wright Place, Palo Alto, CA 94306

**Price:** \$50

**Comments:** "Accu-Shapes is to graphics programs what screen generators are to text programs," states the review. "If you're writing a game that requires small characters on the screen, you'll find life much easier with the assistance of Accu-Shapes."

Accu-Shapes draws shapes on the screen and stores them onto disk in tables, according to the review. All shapes are created in color, so a black-and-white monitor is rather useless. "If you're in the business of writing programs that need shapes," says the review, "don't waste your time reinventing the wheel. Draw it with Accu-Shapes."

Reader Service Number 418

(Reviewed in InfoWorld, November 22, 1982)

**APPLE****Inventory Manager**

**System Requirements:** Apple II, 48K, ROM Applesoft, one disk drive

**Manufacturer:** Synergistic Software, 830 North Riverside Drive, Suite 201, Renton, WA 98055

**Price:** \$149.95

**Comments:** "Retailers and distributors take note," says the review, "this program alone may well justify the purchase of an Apple... *Inventory Manager* comes equipped to handle your inventory of up to 1200 items for single disk drive owners. It keeps records of your current level of inventory and the sale price, wholesale price, vendor, stock on order, reorder point and markup for each inventory item."

The review concludes that "*Inventory Manager* is among the most complete programs of its type on the market today."

Reader Service Number 408

(Reviewed in Softalk, November, 1982)

**APPLE****The Mask of the Sun**

**System Requirements:** Apple II with 48K, ROM Applesoft, one disk drive

**Manufacturer:** Ultrasoft, 24001 S.E. 103rd St., Issaquah, WA 98027

**Price:** \$39.95

**Comments:** The Mask of the Sun is an innovative adventure game with intriguing puzzles and challenges. In this game, according to the review, you don't flash from one place to another, but "you move there—watching the scenery go by on the way."

Don't overlook details, cautions the review, for "A puzzle easily solved, an apparently innocuous statement casually made in the beginning of *Mask* may well be the sole key to a crucial puzzle toward the end."

Reader Service Number 407

(Reviewed in Softalk, November, 1982)

**APPLE****Computer Acquire**

**System Requirements:** Apple II with 48K, ROM Applesoft, one disk drive

**Manufacturer:** Microcomputer Games/Avalon Hill, 4517 Harford Road, Baltimore, MD 21214

**Price:** \$25

**Comments:** Computer Acquire, according to the review, "is a nongraphic game of hotel empire building, with some of the elements of bingo. Up to six people can play on any one of five levels of difficulty, or you can play solo against the computer."

Somewhat like Monopoly, the object is to acquire hotels, form chains thereof, buy out others, and so on. "*Acquire* is a fast-paced game for family or friends," concludes the review.

Reader Service Number 406

(Reviewed in Softalk, November, 1982)

**APPLE****Odin**

**System Requirements:** Apple II with 48K, ROM Applesoft, one disk drive

**Manufacturer:** Odesta, 930 Pitner, Evanston, IL 60202

**Price:** \$49.95

**Comments:** Odin is a program through which you can play, and learn, the board game Othello, according to the review, which also praises the manual and the care that the whole package displays.

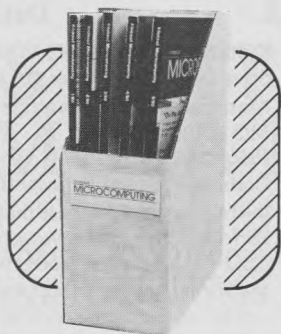
"What *Odin* can provide for the beginner and expert alike," says the review, "is a way of learning new strategies and keeping practice for your favorite flesh-and-blood opponent. And when that match occurs, *Odin* has an option for supervising a two-player game as well."

Reader Service Number 405

(Reviewed in Softalk, November, 1982)

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## CP/M

### dBase II

**System Requirements:** 56K; CP/M version 2.2 (also available for CDOS, CROMIX and MP/MII); 8080, 8085 or Z80-based micros; one or more disk drives; cursor addressable CRT, 24 lines by 80 columns; optional printer

**Manufacturer:** Ashton-Tate, 9929 W. Jefferson Blvd., Culver City, CA 90230

**Price:** \$700

**Comments:** dBase II is a clear and highly structured database language. According to the review, the structured programming is a strength—although the accompanying documentation is inadequate.

Although slow for sorting and for creating indexes for large files, the program, says the review, "is an excellent tool for business computing. Unlike conventional computer languages, programming can be fun with dBase II. It is quickly learned and does most of what Cobol can, plus much more."

Reader Service Number 411

(Reviewed in Small Business Computers, July/August, 1982)

## ATARI

### Data Perfect

**System Requirements:** Atari 800, DOS 3.3, 48K RAM, one disk drive minimum, printer or various 80-column displays

**Manufacturer:** LJK Enterprises, Inc., PO Box 10827, St. Louis, MO 63129

**Price:** \$99.95

**Comments:** Data Perfect offers you many features, according to the review, for a database that fits into 140K of storage. "With Data Perfect," says the review, "you can create new data bases, make updates and corrections, create reports to your own specifications or generate mailing labels."

It is, concludes the review, "a complete data base program that performs a variety of tasks easily."

Reader Service Number 419

(Reviewed in InfoWorld, November 29, 1982)

## APPLE

### Applegraphics II

**System Requirements:** Apple II; Pascal, with Pascal or Fortran compiler; 48K RAM with language system; disk drive with controller; color monitor optional

**Manufacturer:** Apple Computer, Inc., 10260 Bandley Drive, Cupertino, CA 95014

**Price:** \$75

**Comments:** "Applegraphics II," says the review, "is... designed to enhance the existing graphics abilities of Apple Pascal." You need a general knowledge of Pascal programming to use this program, which lets you construct images by drawing lines between points defined in terms of coordinate axes.

"In addition to improving two-dimensional drawing," the review continues, "Applegraphics II offers a full set of three-dimensional drawing procedures—its most outstanding feature."

Reader Service Number 420

(Reviewed in InfoWorld, November 1, 1982)

## ATARI

### Salmon Run

**System Requirements:** Atari 400 or 800, 16K (cassette) or 24K (disk)

**Manufacturer:** Atari Program Exchange, Box 427, 155 Moffet Park Drive, B-1, Sunnyvale, CA 94086

**Price:** \$22.95

**Comments:** "Those who've grown tired of destroying things in arcade-type games, take heart," says the review. "Salmon Run requires that you save things... in this case, ol' Sam the salmon, who's desperately moving upstream to spawn. Naturally... fish have many enemies... and all will appear as the player gains proficiency."

The player helps Sam swim past bears, birds and little boys, and success is rewarded by another life for Sam. "Salmon Run is a charming game," concludes the review; "it's also quick to learn and quite contagious."

Reader Service Number 415

(Reviewed in Softline, November, 1982)

## APPLE

### Rubic's Cube Unlocked

**System Requirements:** Apple II with disk drive

**Manufacturer:** Double-Gold Software, 13126 Anza Drive, Saratoga, CA 95070

**Price:** \$24.95

**Comments:** "Rubic's Cube Unlocked won't explain how it works, so you have to pay attention if you want to solve the cube sans computer at a later date," says the review. With a color monitor, the display looks like the cube; in black and white, the colors are indicated by letters.

Other features, according to the review, are that the program "will save a cube in memory for later use... and let you enter moves of your own for solving a random cube selected by the computer."

Reader Service Number 421

(Reviewed in Popular Computing, December, 1982)

*Popular Computing*, published by BYTE Publications, Inc., 70 Main St., Peterborough, NH 03458; \$18 annually, 12 issues.

*InfoWorld*, published by Popular Computing, Inc., 375 Cochituate Road, Box 880, Framingham, MA 01701; \$25 annually, 51 issues.

*Small Business Computers*, published by Creative Computing, 39 East Hanover Ave., Morris Plains, NJ 07950; \$12 annually, six issues.

*Softalk*, 11160 McCormick St., N. Hollywood, CA 91601; \$24 annually, 12 issues.

*Softline*, published by Softalk Publishing Company, 11160 McCormick St., N. Hollywood, CA 91601; \$6, six issues.

*Table. Addresses and subscription prices of the magazines publishing the software reviews digested in this department.*

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# Software Breakthrough For Your IBM PC

*This MBA package—a database management, spreadsheet, graphics and text-editing program, all rolled into one—may be enough to justify your computer purchase.*

By Thomas V. Bonoma

The first big ripple in the wave of the future for software could well be Context Management Systems' MBA. It's a multifunction spreadsheet and a database management, graphics and text-editing program written in Pascal and targeted toward the professional/managerial IBM PC user.

The MBA's software concept is clever and useful, and even though the current implementation (version 1.4) doesn't quite live up to the promise of the concept, it's a worthwhile and valuable software tool. In fact, it makes you want to call up the Context people and demand version 2!

When Context (or another vendor—there's going to be a lot of competition) gets this system fine-tuned, it

may be the only program you'll need for your PC.

## The Concept

The flexibility and integration of the MBA must be understood if you're going to appreciate any evaluation of the package. It contains a Calc-type spreadsheet program which will look pretty familiar to VisiCalc users but which goes a good distance beyond that program by giving the user more built-in functions (for instance, standard deviation and internal rate-of-return). It also offers Boolean logic manipulation, If-Then constructs and an impressive array of display formatting options.

The MBA includes a complete data-

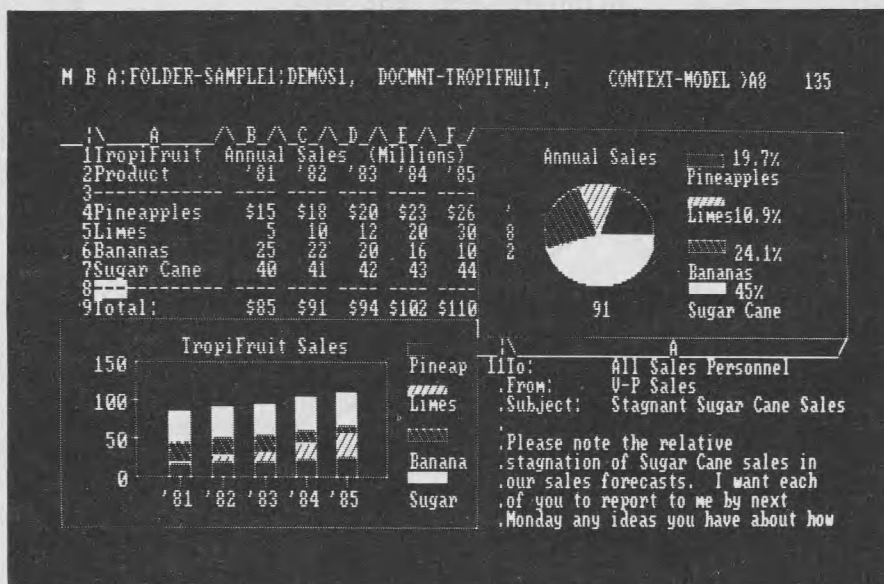
base management program, not just a file-card system. Data entry is as easy as anything I've seen and retrieval and sorts are well-implemented. There's also a text-editor (CMS calls it "Word Processing") with some enhanced capabilities for capturing and using the spreadsheet models as well.

But the real kicker is that the spreadsheet (or the Modeling Context, CMS would say) supports one of the best graphics packages I've seen.

So there you have it—three excellent programs and an acceptable one. It's reason enough to end a review and recommend that you run down to your authorized dealer to purchase this software. (By the way, that's the only way you're going to buy it—CMS insists on a rigorous dealer training schedule before authorizing them to sell the program; thus far the company has qualified relatively few dealers. And CMS absolutely will not sell by mail-order or from its corporate offices.)

The concept of the MBA is that each of the programs interacts with the others, or can be made to do so.

Say you want to construct a graph and have the graph (or two or three) on the screen while a table is there too. Or perhaps you want to write a memo and incorporate the table and those graphs with the text of the memo. Or, you may want to define the table, which may list, for example, customers' order sizes and delivery dates. The MBA can handle all of these tasks, and a few more.



The Context MBA is the first personal computer program to totally integrate electronic spreadsheet (modeling), word processing, graphics, database and telecommunications functions in one program. The MBA screen can be divided into as many as four independent windows, as shown in this photo. If numbers in the model (upper left window) change, the graphs automatically redraw to reflect the changed totals. The MBA is available from Context Management Systems, 23864 Hawthorne Blvd., Suite 101, Torrance, CA 90505, for \$695.

Address correspondence to Thomas V. Bonoma, 45 Drum Hill Road, Concord, MA 01742.

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## The Context of Context

The MBA comes bound in an attractive, oversized (by IBM PC standards) three-ring binder which contains two 5¼-inch single-sided, single-density diskettes, a 20-lesson tutorial and a reference manual. This, by the way, is

"preliminary documentation." And apparently there are some photos and an index which are missing.

A separate manual insert tells the PC user about the specific implementation on his machine. Additionally, it is promised in the documentation that

if you buy now, you'll soon receive version 2.0 of the software. This release is supposed to include a Telecommunications Context. (As of this writing, version 1.3, which incorporates greater speed, had been sent by Context to all of its purchasers. The Telecommunications Context had not yet been released.)

Both 5¼-inch diskettes are necessary to boot the system (a typical Pascal requirement). The second disk drive is not needed after the initial boot, so it can be used for data diskettes.

It is implied in the documentation that the system can be used with hard disks, but it actually cannot be done in this version; two floppies are required to load the system, and the software is copy-protected.

When the system loads, the MBA software asks if you'd like help screens included (a 30K or 40K penalty out of memory) in the load. If you say yes, then you'll have a SuperCalc-like ability to hit the "?" key at any time during your session. You'll also have the luxury of being told by MBA what you can and can't do with its commands.

You also must tell the system whether you have a color adaptor card/monitor on your system and whether you'll want to use graphics in this session (the monochrome adapter is used if you don't want graphics; the color one if you do).

Obviously, you'll need a pretty sophisticated PC setup to use the MBA. You'll need 256K of RAM (that's IBM's 64K configuration, plus at least a 192K add-on board). Also, effective graphics output requires a color adapter, a monitor and an IBM/Epson printer equipped with GrafTrax dot-matrix graphic chips (a \$40 or \$50 modification to your current IBM PC printer).

The requirements don't mention double-sided drives, but they can be used even though the MBA is not set up to employ them. (Version 1.4 users already have this capability.)

OK, here we are with this big PC just ticking over like a 1964 V-8. Now what? Well, now you can use the MBA to do an awesome amount of computing that one program could never do before.

## Using the MBA

Listing 1 shows a sample screen print taken during an MBA run. Note that the word "Hardware" in cell A1 did not print correctly, even though it was correct on the screen. The reason is that if the cursor is covering some

```
M B A: FOLDER-DATAONE:SYSTEST, DOCMNT-GRAFOOL, CONTEXT-WRDP >A1 246

  \_ A _\_ B _\_ C _\_ D _\_ E _\_ F _\_ G _\_ H _\_ I _\_ J _\_ K /
1  rdware 1981 1982 1983 1984 Total
2
3  Bolts   2    3    6    9    20  WX  GRF  <-LTR1
4  Nuts    5    7   12   17   41   -   -   <-LTR2
5  Washers 10   15   21   35   81  W1  GRF  <-GRF2
6                                     <-LTR3
7  Totals  17   25   39   61   142
8
9 There are certain things which can be done with MBA.
10
11 I can save this spreadsheet to a single cell,
12 here-> Hardwa <-- Then, I can insert it into
13 letters (see above LTR 1).
14
15 I can graph the data, and print those too.
16 See GRF1 and GRF2 above.
17
18 Or, I could save the sheet as a data-
19 base, and sort, search, and retrieve records.
20
```

Listing 1. Sample screen print taken during an MBA run.

Listing 2. Sample memorandum from MBA.

### Memorandum

To: Potential Purchasers of Context MBA  
Fr: Tom Bonoma  
Re: Some Things It Does, and an Evaluation

The Context MBA is a useful piece of software which has three major operating modes. The first is a Modeling Context, a VisiCalc-like spreadsheet which has more functions than VC (internal rate of return, etc., plus four windows), but is slower because it is coded in Pascal. If you've got the equipment, Modeling mode supports a very nice graphing package, worth the price (\$695) of the system alone.

The second context is a Database Management one, a very nice and complete DBMS which allows pretty sophisticated but very simple sorting, data retrieval, and the like.

The last context is the Word Processing context, which essentially is the Pascal text editor enhanced by some commands which allow you to incorporate tables, and even graphics, in your letters. Context says they will upgrade the program to future releases free (e.g., a telecommunications package in the fall).

So, what can you do with it? Well, I could incorporate a spreadsheet from the modelling context here, in my report. Thus:

Hardware	1981	1982	1983	1984	Total
Bolts	2	3	6	9	20
Nuts	5	7	12	17	41
Washers	10	15	21	35	81
Totals	17	25	39	61	142

Viola! Two keystrokes, and a single cell! Now, I could talk about it. Blah, blah, etc. And, if I had a mind, I could incorporate graphs of it to explain it better in my memo. Here is Graph Number 1, a Multiple Perspective Bar Chart:

More

letters, they will not print. (The other apparently incomplete words, like "Hardwa" in cell B12, are *not* the result of a bug—I'll explain shortly.)

The top line of the screen shows an important aspect of MBA's sensible document-storage philosophy. A volume (a diskette) is divided by the user into "folders." These folders must be initialized before use to a number of 512-byte disk blocks. A small folder might be 50 blocks; a big one, 300 (a single-sided disk has 316 usable blocks on it).

One problem with this system is that the user often doesn't know in advance how many blocks to allocate to a folder, and many users feel uncomfortable with the notion of block allocation. Of course, there is no reason a different folder couldn't be set up for a document which outgrew its original folder, but the software automatically could do this job too.

Once a folder is designated, any number of documents can be filed in it. A document might be a spreadsheet model, a database, a letter, a memorandum or anything else you put there.

Note also that, on the top line of Listing 1, the system is currently in Word Processing Context (MBA's name for the various spreadsheet, database or word processing modes the user can choose), which is to say that I was editing Listing 2 at the time. And, the 246 in the top right corner means that I have approximately 123K of memory left in my minimally-equipped 320K machine. (I never thought I'd feel bad with "only" 320K.)

Now, look closely at the spreadsheet, contained in cells A1-F7. It's a plain-vanilla 3x4 Calc-type matrix in which I've added the row and column margins while in Modeling Context. Nothing to it.

But now look at the text below the spreadsheet; it explains some other things I could have done with the MBA. Most interestingly, cells A11 and following claim that I've squashed the entire matrix above into cell B12. Why would anyone want to do that?

The Compress command in the MBA is powerful, because when you squash matrixes into a single cell, you then can edit that single cell like any other text (numbers lose their properties when squashed and become text). You also can incorporate the single cell into some other context, such as a memo you're working on in word processing. Listing 2 shows how this can

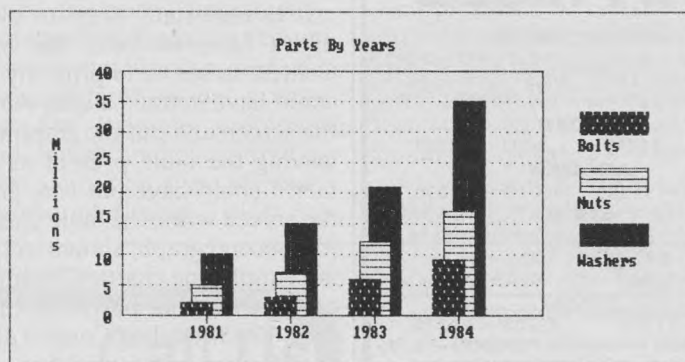
be done; I copied cell B12 into the memo I wrote.

Now look at cells H2-H6 and G2-G6. First, cells G2-G5 are pattern codes that tell the graphics cells what kind of cross-hatching I want on the bar graphs. You don't have to specify the codes; the program does that for

you. But if you want to get fancy, the MBA allows a high degree of control over the graph's parameters.

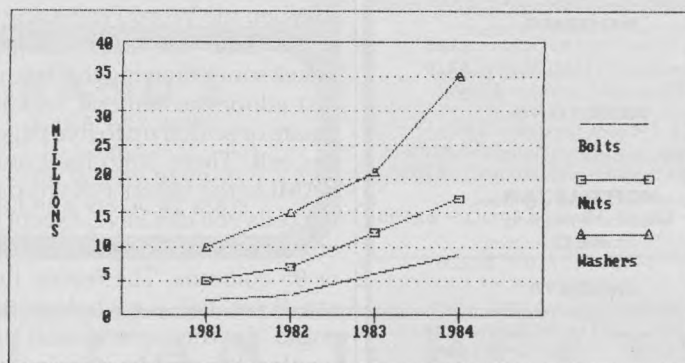
Cells H3 and H5 are graphics cells; with a single spreadsheet command, I told the Modeling Context that I wanted cells B2-E5 graphed as a multiple-perspective bar graph, that I wanted

*Listing continued.*



What generated graph 1? Was the code tough? Uh-uh; it looks like this:  
`H3>@PLOT(BARP)+@DATA(R,B3...E5,A3,G3)+@TTL(L,'Millions'),etc.`  
 A single line, occupying a single cell of the matrix!

Here's another graph of the same data, which I've plotted as a line chart [`@PLOT(LINE)`, etc.] with even less code:



So, pretty clever. And, I haven't even mentioned any of the uses to which you could put the Database Context at all, I've been so busy showing you the Modelling, Graphing, and Word Processing contexts.

How does it evaluate? Well, it requires a lot of memory, and a fully-equipped system to work. But given that, and the criticisms that (1) much of the modelling work is slower than need be because it is coded in Pascal, and (2) the word processor is rudimentary, doesn't allow pagination, boldfacing, underscoring, or any of the other wonderful things we've come to expect from WordStar, I really like the MBA.

#### OVERALL EVALUATION

Modelling Context - Good, complete, -Calc type spreadsheet program. Slow.  
 Graphing Support - Outstanding!  
 Database Context - Very nice, complete, and easy-to-use.  
 Word Processor - Incomplete, inadequate for letter quality.



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the labels "bolts," "nuts" and "washers" used as legends for the bars, that I wanted the labels 1981-1984 to be used on the x-axis, that I wanted appropriate titles on the top and left of the graph, that I wanted horizontal grid marks and that I wanted the graph to use some nonstandard but good-looking hash marks for the bars. The result, and the single line of command it took to generate it, is the first graph shown in Listing 2.

It is important to point out that I didn't have to leave the Modeling Context to see or to print my graph. I could have defined a split-window on the screen and put the graph up while leaving the table present as well; in fact, I could have put *both* graphs on the screen while the table was present (the second graph, shown in Listing 2, is a simple line chart). (Getting a sense of the awesome power of this package?) The Modeling Context allows up to four separate windows, each of which may contain graphs or tables.

### A Blank Look

All I have to explain now is the three seemingly blank cells around the GRF ones (H3 and H5). They aren't really blank, of course; they contain the text portion of the memorandum in Listing 2.

When the Word Processing Context is invoked, the user essentially invokes something much like the Pascal text editor; he can edit, modify, marginate or search up to five pages of text per cell. There is no limit (outside of RAM) to the number of word processing cells you can have, except that any one matrix may not exceed 999 rows or 95 columns. The reason that there are three cells, each less than five pages, in this spreadsheet is that I wanted the graphs interspersed with the text, so I left room on the pages for them. (Read Listing 2 carefully.)

The only thing I have not illustrated by these examples is the Database Context. That's because it's such a full-fledged implementation of a good database management system (DBMS) that I'm at a loss for how to illustrate this "context" in a short review.

Suffice it to say that the spreadsheet in Listing 1 could be defined as a database simply by saving a copy of it in the Modeling Context. The labels in the top row of the model become the fields in the database. The entries in each successive row become a record.

Then, it's an easy matter to switch to the Database Context, and retrieve,

search, sort, update, delete and do anything else to the records that your heart desires. The DBMS makes especially good use of partial search keys and allows you to sort on six different keys at once. Also, for ease of use it significantly outshines many other packages on the market.

It's important to note that I've just skimmed the surface of the power (and complexity/sophistication) of this tool. For example, the cell format option alone offers nine major alternatives, each of which has up to four suboptions.

The documentation is especially well-written, the tutorial is complete and appropriate, help screens are included and a reference card is provided, but you still should plan for a self-training period of eight to 20 hours before you become adept at using this system. If you're an experienced VisiCalc user, you can cut that training time almost in half.

### The Other Side of the Coin

There are usually some complaints about software that costs nearly \$700. The MBA is no exception.

First, and most maddening, the CMS people elected to supply the user with a wide array of learning tools, but decided it was OK for the program to print error message numbers when you do something wrong. That's plain bad software design.

You shouldn't have to go thumbing through the appendix to figure out that "Error 432" means you made a boo-boo when keying in the range of values you wanted the program to graph for you. Even if you understand that CMS probably did it to save on memory, that excuse is still a little hollow, especially when you need a 256K machine to run the program.

Unfortunately, the error numbers aren't the MBA's only faults, nor are they the most debilitating. The primary problems are the slowness (corrected somewhat in release 1.4) and the high number of disk accesses to which the program almost constantly resorts (presumably because of its large size; it's reputed to contain over 40,000 lines of code).

To a degree, the slowness is inherent in the high-level Pascal language used to code the program. However, disk accesses occur at times when you wouldn't think the program would need them, like when you're editing a formula in a cell or reformatting a cell. Managers and professionals like to

have their answers *now*, not in two or three or 30 seconds.

I contacted CMS about these disk accesses, and was told that some are due to the copy-protection scheme used and that future versions will be much faster.

An extreme example of the slowness of the system is illustrated by the recalculation option, which recomputes the spreadsheet after changing its values. I timed this option on a large matrix (55 columns by 20 rows, plus graphics and word processing cells) at around four minutes. While the program lets you know it's working on the problem (by using a counter), it takes a while.

In all fairness, when you get a VisiCalc model at or near the 64K limits of

its memory space, recalculation can take almost a full minute. It should be pointed out that recalculation on the MBA is not automatic and must be done whenever new values are input to the spreadsheet. (Again, version 1.4 has taken some steps to fix this problem by letting you recalculate only part of the spreadsheet—but it's still not good enough.)

Another serious shortcoming of the system is the Word Processing Context, a thinly-disguised implementation of the standard Pascal text editor.

The Pascal text editor is a good one, but it most certainly is not a word processor. For example, automatic page break signals are not inserted into the text (although they are computed), and underlining, boldfacing

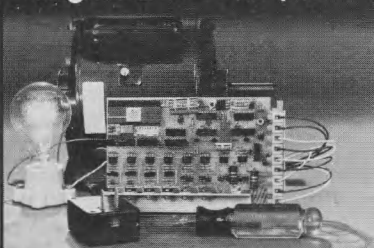
and other options we've come to demand from even a rudimentary system are not present. You cannot set up headers, footers or any of the other formatting options you like, and even though the word processor justifies text as it goes, subsequent insertions and deletions require a manual marginating command.

As a text editor that allows the composition of memoranda around graphs and tables, it is perhaps adequate. As a word processor, it certainly is not. If you'd like to see what *can* be done with the Pascal system as a word processor on the IBM PC, take a look at Beaman Porter's PowerText; the MBA should incorporate a system like that.

No provision is made for a letter-quality line printer as an alternate de-

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vice, although Pascal allows it. (The CMS people say you can use one by first outputting your work as a disk file and then specifying the remote output device.) And, the print routine apparently has a bug such that, when used with graphs, it messes up the end-of-page counter and asks for permission to abort the job. If you reposition the paper and say "No," everything works fine. But again, you shouldn't have to.

### User Friendliness

Well, we're over the hump on problems now, but we're not yet done. In the area of user friendliness, CMS has gone to great lengths to write tutorials and include help screens (but not to the length of including demo files on the disks). However, the sheer size and number of options given in the system make it formidable for the user. Weaker-willed users may put the program down after four or five hours, vowing to use only VisiCalc, but that would be a mistake, for the MBA offers a lot for the committed user.

By the way, some of the routines,

MBA Vital Statistics	
<i>Vendor:</i>	Context Management Systems, 23864 Hawthorne Blvd., Suite 101, Torrance, CA 90505.
<i>Price:</i>	\$695 (with future upgrades through version 2.0).
<i>Version:</i>	1.4, Pascal code (two disks).
<i>Requires:</i>	IBM PC, 256K, two drives, color adapter board. Recommended: IBM/Epson printer with GrafTrax.
<i>Manual:</i>	Tutorial (293 pp.) and Reference (221 pp.); copy-protected.

especially the graphics ones, require an adjustment before they can be used well. Plan to use them for some time before you become competent with them.

A couple of the problems raised earlier should be repeated here. The graphics screen dump does not print characters under the cursor. Be sure to move it to an empty cell before printing. I think the software should either

dynamically allocate space to folders (that is, it should just do it, and not make the user worry about it), or it should be more informative by displaying how much storage is left in any folder at any one time.

What MBA does now is to "catch" you by giving those dreaded numbered error messages; when you look them up, you find out you've run out of room in the folder you're using.

### The Bottom Line

I'm very impressed with the MBA, perhaps as much for what it promises to become as for what it currently is. It's an excellent and integrated piece of work of which the designers and coders should be proud. The MBA is worth buying—as long as you have the need for it (it's not a toy or even a casual tool) and as long as your system is configured to support it.

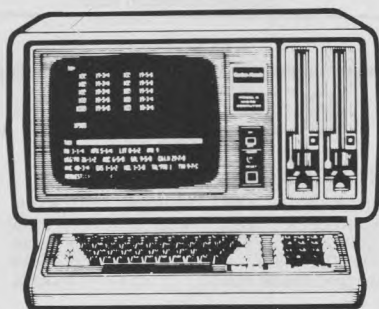
When upgraded additions (beyond 1.4) come out with some of the problems reworked (and all the problems I mentioned could be fixed with some tuning up), it may well be one of those pieces of software that makes it worth buying a whole computer system. ■

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— Carl Galletti and Roger Amidon, owners.

Software with Manual/Manual Alone

All of the software below is available on any of the following media for operation with a Z80 CPU using the CP/M\* or similar type disk operating system (such as our own TPM\*).

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# New Hope for the Harried Tax Filer

*With tax time approaching, computerize your information for your tax return. This tax-preparation program, written in Apple Pascal, is easily converted to any Pascal system.*

By James R. Florini

**T**ax time again! Sometimes I think that assembling all the information for a tax return is almost more painful than paying any extra tax owed. Almost.

Of course, I could buy a commercial tax return program and carefully keep track of each expenditure all year long, but I prefer to write programs for myself so they can be tailored to fit my specific situation. I've learned a good bit about Pascal programming, so this year's first approach to the checkbook and Form 1040 quickly led me to write the accompanying program. In addition to grouping deductions in the order that the IRS uses, it also shows

several features of Pascal which might make Basic programmers think about learning a new language. (This program was written and used on an Apple II, but it should be transferable to any Pascal system.)

## Program Features

Pascal features illustrated in this slightly beyond-beginning-level program are user-defined scalar variables, storage and retrieval of record structures from disk and selective retrieval of records on the basis of the category in which they fit. This last feature shows how Pascal records can form the basis for sophisticated database systems; the program can

be set up to search for any field of a record structure, and for any specified content in that field.

Looking at the program, there are several points that might be helpful to programmers just getting familiar with Pascal. The CONST declaration shows that a constant can be a string as well as a numerical value; in this case, it is just a simple way to display (while running the program) the date at which it was last modified. (For complex programs that go through a lot of revisions, this is handy.) More important features are illustrated in the type definitions. The SUBCATEGORY definition shows how a Pascal programmer can invent a new data type containing the items needed for a particular program; in this case, they are the categories of deductions listed on IRS Form 1040, plus another one for Business. This is followed by a record structure, which includes fields for a check number, the category in which each check is to be added, some description of the check and finally the amount. Disk space is conserved by making it a packed record, and by limiting the length of the string entries. Strings take up a lot of space, and limiting the length is a good memory-saving technique in large programs; it's a good idea to form economical habits from the be-

*Program listing. Income tax categories in Apple Pascal.*

```
(**V-*) {TURN OFF STRING LENGTH CHECK}
PROGRAM TAX_DEDUCTIONS;
CONST DATE = '1/10/83';
TYPE GOODSET = SET OF CHAR;
    SUBCATEGORY = (MEDICAL, TAXES, INTEREST, CONTRIBUTION, UNION,
        TAXPREP, OTHER, BUSINESS);
    EXPENSES = PACKED RECORD
        CHECKNUM: STRING [5];
        CATEGORY: SUBCATEGORY;
        DESCRIPTION: STRING [40];
        AMOUNT: REAL;
    END;
VAR DATAFILE: FILE OF EXPENSES;
    KIND: SUBCATEGORY;
    DONE: BOOLEAN;
    RECNUM, TOTALREC: INTEGER;
    PRINTOUT: TEXT;
    LABELCATEGORY: STRING [16];

FUNCTION GET_CHAR (PROMPTLINE: STRING; ACCEPTABLE: GOODSET): CHAR;
VAR ENTRY: CHAR;
BEGIN
    REPEAT
        WRITE (PROMPTLINE); {TELL THE USER WHAT IS WANTED}
        UNITCLEAR (1); {DELETES ANY TYPE-AHEAD CHARACTERS, AVOIDS ACCIDENTS}
        READ (ENTRY); WRITELN; WRITELN;
    {THE FOLLOWING CONVERSION TO CAPITALS MAKES PROCESSING OF THE REPLY EASIER}
```

More →

*Address correspondence to James R. Florini, Biology Department, Syracuse University, Syracuse, NY 13210*

ginning. It may seem a bit strange to handle the check number as a string, but this allows the use of non-numeric entries, and you won't need to add up the check numbers, anyway.

The variables used here are pretty straightforward; Datafile is the identifier used for the file of records on diskette, and Printout is the variable used to address the printer. The VAL function corrects what I consider to be the worst omission in most forms of Pascal. In their zeal to keep variable types pure, the language developers have made things unnecessarily difficult for the user. If you just touch a non-numeric key as the first entry when an integer or real variable is expected, you get a fatal run-time error—with complete loss of everything you have entered up to that point. Furthermore, it is impossible to back over and erase an erroneous non-numeric entry before pressing return (at least, this is true on the Apple II) unless the variable type is string. So this purity of data comes at a high price. As a result, there are a number of Pascal adaptations of the Basic VAL function in user magazines, etc.; all of them allow the conversion of string entries into real or integer values. The limited version presented here is adequate for the Tax program, but it doesn't allow entry of numbers like  $1.25 \times 10^7$  (1.25E7).

The Get\_Char function is a handy utility that filters any erroneous entries, thus avoiding the things that can happen to the unwary user when he hits a key other than one of the specified possibilities. This particular function simply keeps ringing the alarm until an acceptable letter (listed when the function is called in the program) is entered. Clear\_Screen is not at all essential, but I've found it useful in program development to know just how much memory I have left. This is particularly handy in more complex programs using segment procedures and invoking large library units like the Apple Turtle-graphics unit.

Get\_Entry is another user-friendly feature of the program. It provides a blank of the appropriate size in which you can type the requested entry, and it prevents you from entering one that is too long (and thus avoids a fatal out-of-range error). After a good deal of distress with programs used by other people in my laboratory, I've become painfully aware of the necessity of minimizing the possibili-

*Listing continued.*

```

IF ENTRY IN ['a'..'z'] THEN ENTRY := CHR (ORD(ENTRY) - 32);
IF NOT (ENTRY IN ACCEPTABLE) THEN WRITE (CHR(7));
UNTIL ENTRY IN ACCEPTABLE; {AVOIDS ACCIDENTAL ACCEPTANCE OF A WRONG CHAR}
GET_CHAR := ENTRY;
END; {GET-CHAR}

PROCEDURE CLEAR_SCREEN;
BEGIN {THIS SEQUENCE WORKS ON THE APPLE II SCREEN; DIFFERENT ON OTHERS}
WRITE (CHR(12), CHR(25)); {ERASE SCREEN, "HOME"}
Writeln ('MEMORY AVAILABLE IS ':40, MEMAVAIL, ' WORDS.', DATE:25);
Writeln; UNITCLEAR(1); {AVOID TYPE-AHEAD ERRORS}
END;

PROCEDURE GET_RECORD;
BEGIN
SEEK (DATAFILE, RECNUM);
GET (DATAFILE);
END;

PROCEDURE GET_DESCRIPTION (WHICH: SUBCATEGORY);
BEGIN {USED TO LABEL ENTRIES AT SEVERAL POINTS IN THE PROGRAM}
CASE WHICH OF
MEDICAL: LABELCATEGORY := 'Medical Expenses';
TAXES: LABELCATEGORY := 'Taxes Paid';
INTEREST: LABELCATEGORY := 'Interest';
CONTRIBUTION: LABELCATEGORY := 'Contributions';
UNION: LABELCATEGORY := 'Union Dues';
TAXPREP: LABELCATEGORY := 'Tax Preparation';
OTHER: LABELCATEGORY := 'Other';
BUSINESS: LABELCATEGORY := 'Business';
END; {CASE}
END; {GET DESCRIPTION}

PROCEDURE GET_ENTRY (LEN: INTEGER; VAR ENTRY: STRING);
{ "LEN" ESTABLISHES HOW LONG A PARTICULAR ENTRY CAN BE }
VAR CHOICE: CHAR;
I: INTEGER;
BEGIN {THIS IS A GENERAL UTILITY WHICH AVOIDS VALUE RANGE ERRORS}
REPEAT
GOTOXY (0, 15); FOR I := 1 TO LEN DO WRITE ('_'); Writeln (' ');
GOTOXY (0, 15); UNITCLEAR (1); READLN (ENTRY);
IF ENTRY <> '' THEN
BEGIN
IF LENGTH (ENTRY) > LEN THEN
BEGIN {TRAPS ANY OUT-OF-RANGE ENTRIES}
CHOICE := GETCHAR
('THIS LABEL IS TOO LONG! PRESS <SPACE> AND ENTER A SHORTER ONE.', [' ']);
CLEAR_SCREEN;
END;
END;
UNTIL LENGTH (ENTRY) <= LEN;
END; {GET-ENTRY}

PROCEDURE GET_FILE; {ADDS TO EXISTING FILE, OR STARTS NEW ONE}
VAR SPACE: CHAR;
BEGIN
{**I-#} {TURNS OFF CHECKING TO AVOID FATAL ERROR IF FILE NOT PRESENT}
RESET (DATAFILE, '#5:TAXES'); {OPENS A PREEXISTING FILE, IF PRESENT}
IF IORESULT = 0 THEN {INDICATES A FILE "TAXES" WAS FOUND}
BEGIN
RECNUM := -1;
REPEAT {FINDS OUT HOW MANY RECORDS ARE ALREADY FILLED IN THE FILE}
RECNUM := RECNUM + 1;
GET_RECORD;
UNTIL EOF (DATAFILE);
RECNUM := RECNUM - 1; {WENT TO END TO GET THE "EOF" SIGNAL}
Writeln ('Ready for more entries, starting with record #', RECNUM+1, ':');
GET_RECORD; {TO BE ABLE TO READ THE LAST CHECK NUMBER}
Writeln ('The last entry present was for check #', datafile^.checknum);
Writeln ('ENTER <SPACE> TO CONTINUE ADDITIONS:'); READ (SPACE);
END ELSE
BEGIN {IF NO "TAXES" FILE THERE, START A NEW ONE}
REWRITE (DATAFILE, '#5:TAXES[12]'); {MAKE SURE A REASONABLE SPACE}
Writeln ('A new file for "Taxes" has been opened in drive #2. ');
RECNUM := -1; {GETS INCREMENTED AT BEGINNING OF ENTRIES}
END;
{**I+**} {TURN RANGE CHECKING BACK ON}
END; {GET_FILES}

PROCEDURE ENTER_CHECKS;
VAR CHOICE, WHICH, WHO, WHAT: CHAR;
ENTRY: STRING;
CORRECT: BOOLEAN;

PROCEDURE CHECK_ENTRY; {LOOK OVER EVERYTHING BEFORE RECORDING IT}
VAR I: INTEGER;
BEGIN
CLEAR_SCREEN;
Writeln; Writeln; Writeln ('This is the entry: ');
Writeln; GET_RECORD; WITH DATAFILE^ DO
BEGIN {THIS SHOWS THE NEAT FORMATTING PASCAL ALLOWS}
Writeln (CHECKNUM:5, ' ', DESCRIPTION, ' ':35-LENGTH (DESCRIPTION),
LABELCATEGORY, ' ':25-LENGTH (LABELCATEGORY), ' ':5, AMOUNT:5:2);
Writeln; Writeln; CHOICE := GET_CHAR ('Is it correct? ', ['Y', 'N']);
CORRECT := CHOICE = 'Y'; {USEFUL CONVERSION OF CHAR TO BOOLEAN}
IF NOT CORRECT THEN
BEGIN
Writeln ('RE-ENTER THE DATA FOR CHECK #', CHECKNUM, ' CORRECTLY');
RECNUM := RECNUM - 1;
FOR I := 1 TO 500 DO; {DELAY TO READ THE MESSAGE}
END;
END;
END; {CHECK-ENTRY}
BEGIN

```

*More* →



Listing continued.

```

RECNUM := RECNUM + 1; DONE := FALSE;
GET_RECORD; WITH DATAFILE^ DO
BEGIN
  GOTOXY (0, 11);
  WRITELN ('Enter the Check Number: (<RETURN> only when all done)');
  GET_ENTRY (5, CHECKNUM); (RESTRICTS THE ENTRY TO 5 CHARACTERS)
  IF CHECKNUM = '' THEN
  BEGIN
    CHOICE:=GET_CHAR('Do you REALLY want to end your entries now? ',
    ['Y','N']);
    IF CHOICE = 'Y' THEN (AVOIDS PREMATURE ENDING OF ENTRIES)
    BEGIN
      DONE := TRUE; EXIT (ENTER_CHECKS);
    END ELSE
    BEGIN
      WRITELN ('Enter the Check Number correctly: ');
      READLN (CHECKNUM);
    END;
  END;
  CLEAR_SCREEN; GOTOXY (0, 11);
  WRITELN ('Enter the description of check #',CHECKNUM,' ');
  GET_ENTRY (35, DESCRIPTION);
  WRITELN; WRITE ('Enter the amount of check #',CHECKNUM,' ');
  READLN (AMOUNT); WRITELN;
  CHOICE := GET_CHAR
  ('CATEGORY: M)edical, T)ax, I)nterest, C)ontribution, B)usiness O)ther',
  ['M','T','I','C','B','O']);
  CASE CHOICE OF
    'M': CATEGORY := MEDICAL;
    'T': CATEGORY := TAXES;
    'I': CATEGORY := INTEREST;
    'C': CATEGORY := CONTRIBUTION;
    'B': CATEGORY := BUSINESS;
    'O': CATEGORY := OTHER;
  END;
  GET_DESCRIPTION (CATEGORY);
  CHECK_ENTRY;
  IF CORRECT THEN
  BEGIN
    WRITELN
    (PRINTOUT, CHECKNUM:5, ' ', DESCRIPTION, ' ':37-LENGTH(DESCRIPTION),
    LABELCATEGORY, ' ':25-LENGTH(LABELCATEGORY), '$':3, AMOUNT:7:2);
    IF (RECNUM > 1) AND (RECNUM MOD 5 = 0) THEN WRITELN (PRINTOUT);
    SEEK (DATAFILE, RECNUM); PUT (DATAFILE);
  END;
  CLEAR_SCREEN;
  IF RECNUM > 0 THEN
  BEGIN
    GOTOXY (0,8);
    WRITELN ('PRECEDING ENTRY:'); WRITELN;
    GET_RECORD; WITH DATAFILE^ DO
    WRITELN (CHECKNUM:5, ' ', DESCRIPTION, ' ':36-LENGTH(DESCRIPTION),
    LABELCATEGORY, ' ':25-LENGTH(LABELCATEGORY), '$':3, AMOUNT:7:2);
  END;
  END;
  IF (RECNUM > 0) AND (RECNUM MOD 45 = 0) THEN PAGE (PRINTOUT);
  CLOSE (DATAFILE, LOCK); RESET (DATAFILE, '#5:TAXES');
END;

PROCEDURE PRINT_SUMMARY;
VAR I: INTEGER;
    THISTOTAL: REAL;
BEGIN
  FOR I := 1 TO 3 DO WRITELN (PRINTOUT);
  GET_DESCRIPTION (KIND);
  WRITELN (PRINTOUT);
  WRITELN (PRINTOUT, 'These amounts were paid for ', LABELCATEGORY, ' in 1982:');
  THISTOTAL := 0;
  FOR RECNUM := 0 TO TOTALREC DO
  BEGIN
    GET_RECORD;
    IF DATAFILE^.CATEGORY = KIND THEN
    WITH DATAFILE^ DO
    BEGIN
      WRITELN (PRINTOUT, CHECKNUM:7, ' ', DESCRIPTION,
      '$':38 - LENGTH (DESCRIPTION), AMOUNT:8:2);
      THISTOTAL := THISTOTAL + AMOUNT;
    END;
  END;
  END; (FOR RECNUM...)
  WRITELN (PRINTOUT);
  IF THISTOTAL > 0.0 THEN
  BEGIN
    WRITELN (PRINTOUT, 'Total for ':25, LABELCATEGORY, ' is $', THISTOTAL:8:2);
    PAGE (PRINTOUT);
  END ELSE
  BEGIN
    WRITELN (PRINTOUT, 'There were no expenditures for ', LABELCATEGORY,
    ' IN 1982. ');
    WRITELN (PRINTOUT);
  END;
END; {PRINT-SUMMARY}

BEGIN (MAIN PROGRAM)
  GET_FILE;
  REWRITE (PRINTOUT, 'PRINTER:');
  CLEAR_SCREEN; REPEAT ENTER_CHECKS UNTIL DONE;
  CLEAR_SCREEN; TOTALREC := RECNUM-1;
  IF TOTALREC > 25 THEN PAGE (PRINTOUT); {DON'T WASTE PAPER ON SHORT LISTS}
  FOR KIND := TAXES TO BUSINESS DO PRINT_SUMMARY;
  WRITELN ('ANALYSIS OF EXPENSES IS COMPLETE. ');
  CLOSE (DATAFILE, LOCK);
END.

```

ty of entry errors.

Get\_File simply opens a file for the entry of the list of checks. It also takes care of the possibility of adding to a pre-existing file. It would be relatively easy to allow the user to enter the name to be used for the datafile, but this program is so specifically tax-oriented that I didn't think it necessary.

Of course, the heart of the program is the Enter\_Checks procedure. It contains two subprocedures that allow entry of the subheadings under Miscellaneous, and that require you to verify each entry before it is recorded. Overall, this part is reasonably simple-minded; there is a series of prompts for each necessary entry, and some care is taken to make sure the entry is not an error. In using the program, I found it essential to display the preceding entry; otherwise I got lost in my long list of checks written for various things. Again, to avoid loss of entries if some catastrophe occurs, the disk datafile is locked and reopened after each entry; this takes a bit of time, but a whole lot less than starting over from scratch if there is a momentary power failure.

The assignment of categories is the area most likely to require adaptation for your own use. For example, the Business category could (and probably should) be subdivided, as is Miscellaneous. But businesses differ so much from one to another that I didn't try to write anything specific. All that is required is another subprompt (like that in Get\_Misc) and some further additions to type SUBCATEGORY. Your special needs may dictate still other additions; this part of the program is quite flexible.

Finally, Print\_Summary puts together all the results in a form useful to you (and impressive, I hope, to the IRS). Note that this procedure is called (in the main program) by taking advantage of the fact that SUBCATEGORY is a scalar variable (just like an INTEGER or CHAR), so it can be used to index a FOR...DO loop, thus covering all the categories in sequence. Within the Print\_Summary procedure, the statement IF DATAFILE^.CATEGORY = KIND selects each subcategory in turn, until they've all been printed and totaled. When you start thinking of other ways to select the record that will be printed, to sort checks according to number, etc., you'll be on your way to writing a real database program! ■



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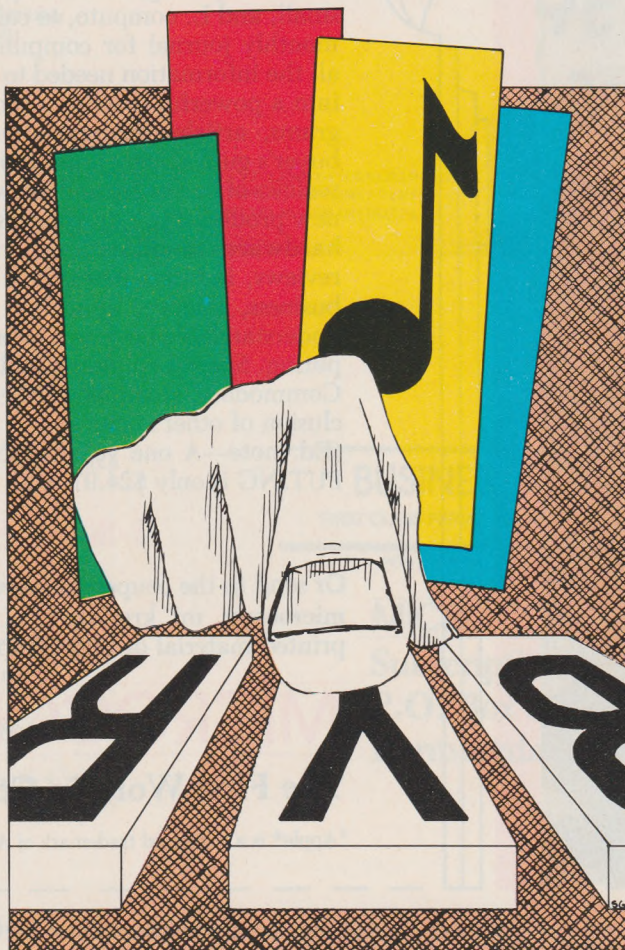
# A Close Encounter with Atari

*You can learn a little bit about yourself with this music synthesizer/light show game program for the Atari.*

By Timothy P. Banse

Ever watch kids and grown-ups at the video arcade pouring an oil sheik's ransom in quarters into this or that game of intergalactic conquest? Besides passing time and building hand-eye coordination, the gamers are flexing an advantage unavailable to yesteryear's Neanderthal hunter-warrior kind. With these readily accessible new-fangled micros comes a new way of thinking, seeing and communicating with the universe. And although at first glance the R Is for Red game may appear similar to a well-known chain store home entertainment device, close scrutiny reveals several dimensions that run deeper than any party game. It's as simple as that.

One of the discovered jewels in this dawn of the Age of High Technology has been researchers' realization that different hemispheres of the brain click in or out while performing different tasks. The brain can operate in two different dimensions in deciphering this light and sound cryptogram. First is the conscious level where you can remember: "Let's see, I saw a blue bar, two greens and then a red." But probably more important is the unconscious or Zen part, the *Force* part where the participant doesn't think about the tennis, jogging or computer game strategy. He simply reacts without



thinking, as many of us do at a task we know only too well.

In R Is for Red, the color and music sequence is not remembered for its individual sights and sounds, but rather is recalled as an entire block or "word" made up of colors. The color bars are like an alphabet—words are spelled out, not with A to Z characters, but with patterns of blues, reds, greens and yellows. As the colors flash on the screen, you don't dissect

the pattern letter by letter, but speed-read it as a word, phrase and sentence.

Sound fascinating? The concept becomes intriguing when recalling the film *Close Encounters of the Third Kind*, where an international team of scientists assembled at Devil's Tower to set up a music synthesizer/light show to communicate with aliens. They communicated with blocks of color and sound in a high-tech, computer-driven Esperanto. How many colors can your eye and brain distinguish? Six or seven at one time is about average, but with practice the galaxy is the limit.

## Exploiting the Atari

One of the more sophisticated software aspects of this color cryptogram is how it uses the player missile graphics. While no animation is used, the program does exploit some of the unique qualities of the Atari personal computer, such as its speed. Instead of having to draw, undraw and then draw again every time the program needs to flash a color on the screen, the Atari uses the player-missile graphics. The first step is to draw the

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bars from top to bottom, one at a time, from left to right. Since no color for the bars is specified at the time of drawing, they are automatically assigned the default color black.

All four players are displayed on the screen, side by side, waiting for the routine that will call each to life when its appropriate color register is poked; it remains painted for as long as the skill level delay loop lets it. The bar is then faded to black and the next appropriate color bar comes out of hiding.

With the Atari, each player has an individual size register that controls its width. For experimentation's sake, poke the number 3 instead of the number 1 with each of the four registers assigned to statement number 1280. Run the program. Each player will have quadrupled in width and each will be overlapping the others. The display will now be quite ugly. For an aesthetic remedy, change the horizontal locations of each of the players in lines 1300 and 1310. Replace the values of 90, 110, 130 and 150 with 50, 90, 130 and 170, respectively. Next time you run the program it will look much prettier.

To play the game, wait while the player/missile graphics are initializing. Read, filling that area of RAM with zeros to clear it and then actually drawing the color bars. A message will then flash on the screen saying SKILL LEVEL (1-5). At that point, hit any number from 1 to 5, with 1 being the slowest and easiest routine and 5 being the fastest, toughest and most interesting.

As the program puts you through its paces, it will flash a color bar on the screen, the color accompanied by its own musical note. When you see a blue bar, hit the letter B. Just touch the key—you won't need to hit return. R is for red, B is for blue and Y is for yellow. When you respond with the correct key for the correct color, another color/musical note will be added to the sequence. You get the picture.

### How the Program Works

Line 110 clears the screen. The poke 84 modifies the print command so that it stays within the range of the Graphics 2 mode, preventing an error message.

Line 120 directs the program to the player/missile graphics sequence. Lines 1180 through 1260 draw the vertical bars 70 bits tall by eight bits wide and paints them black, by default. Line 1280 sets the player at single width, which translates into eight

*Program listing. R Is for Red game program for Atari.*

```

100 REM "R" IS FOR RED GAME
110 ? CHR$(125):REM CLEAR SCREEN
120 GOSUB 1080:REM GO DRAW COLOR BARS
130 DIM TURN(255),SKILL(3),NUMBER(255)
140 REM LOCATE CURSOR
150 POSITION 2,10
160 REM CHOOSE SKILL LEVEL
170 ? #6;"SKILL LEVEL (1 - 5)"
180 REM READ KEYBOARD
190 OPEN #1,12,0,"K"
200 GET #1,SKILL
210 CLOSE #1
220 REM SET SPEED OF DISPLAY
230 IF SKILL=49 THEN SKILL=150
240 IF SKILL=50 THEN SKILL=100
250 IF SKILL=51 THEN SKILL=50
260 IF SKILL=52 THEN SKILL=25
270 IF SKILL=53 THEN SKILL=10
280 REM GET FIRST COLOUR
290 GOTO 640
300 COUNT=0:REM RESET COUNTER
310 REM LOOP TO DO EACH COLOUR
320 FOR I=1 TO NUMBER
330 REM DISPLAY EACH COLOR
340 IF TURN(COUNT)=0 THEN GOSUB 720
350 IF TURN(COUNT)=1 THEN GOSUB 780
360 IF TURN(COUNT)=2 THEN GOSUB 840
370 IF TURN(COUNT)=3 THEN GOSUB 900
380 REM INCREMENT EACH TIME
390 COUNT=COUNT+1
400 REM DO NEXT COLOR
410 NEXT I
420 REM OPEN KEYBOARD FOR READ
430 OPEN #1,4,0,"K:"
440 COUNT=0
450 REM FIRST TIME THROUGH IS 1
460 IF NUMBER<1 THEN NUMBER=1
470 FOR K=1 TO NUMBER
480 REM READ KEYBOARD
490 GET #1,RESPONSE
500 REM KEEP TRACK OF TIMES THROUGH
510 LET ANSWER=TURN(COUNT)
520 REM TRANSLATE ANSWER
530 IF ANSWER=0 THEN ANSWER=82
540 IF ANSWER=1 THEN ANSWER=66
550 IF ANSWER=2 THEN ANSWER=71
560 IF ANSWER=3 THEN ANSWER=89
570 REM MATCH PATTERN AGAINST PLAYER RESPONSE
580 IF RESPONSE<>ANSWER THEN 970
590 COUNT=COUNT+1
600 NEXT K
610 CLOSE #1
620 NUMBER=NUMBER+1
630 REM CHOOSE RANDOM COLOUR
640 LET COLOR=INT(4*RND(1))
650 REM SAVE COUNT IN NUMBER
660 LET COUNT=NUMBER
670 IF COUNT=0 THEN COUNT=1
680 REM LABEL EACH COLOR IN SEQUENCE
690 LET TURN(COUNT)=COLOR
700 REM DO AGAIN
710 GOTO 300
720 POKE 704,48:REM COLOR RED
730 REM MAKE SOUND
740 SOUND 1,50,10,8:FOR J=1 TO SKILL:NEXT J
750 SOUND 1,0,0,0:REM KILL SOUND
760 POKE 704,0:REM COLOR BLACK
770 RETURN
780 POKE 705,128:REM COLOR BLUE

```

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*Listing continued.*

```

790 REM MAKE SOUND
800 SOUND 1,72,10,8:FOR J=1 TO SKILL:NEXT J
810 SOUND 1,0,0,0:REM KILL SOUND
820 POKE 705,0:REM COLOR BLACK
830 RETURN
840 POKE 706,192:REM COLOR GREEN
850 REM MAKE SOUND
860 SOUND 3,96,10,8:FOR J=1 TO SKILL:NEXT J
870 SOUND 3,0,0,0:REM KILL SOUND
880 POKE 706,0:REM COLOR BLACK
890 RETURN
900 POKE 707,255:REM COLOR YELLOW
910 REM MAKE SOUND
920 SOUND 3,96,10,8:FOR J=1 TO SKILL:NEXT J
930 SOUND 3,0,0,0:REM KILL SOUND
940 POKE 707,0:REM COLOR BLACK
950 RETURN
960 TRAP 960:GOTO 240
970 REM MISTAKE ROUTINE
980 CLOSE #1:REM TURN-OFF KEYBOARD
990 REM BLUNDER SOUND
1000 SOUND 1,243,10,8
1010 REM DELAY TO PLAY SOUND
1020 FOR I=1 TO 200:NEXT I
1030 REM TURN OFF SOUND
1040 SOUND 1,0,0,0
1050 REM CLEAR ALL VARIABLES TO ZERO
1060 REM THEN BEGIN AGAIN
1070 CLR :GOTO 130
1080 GRAPHICS 2+16:SETCOLOR 4,7,4
1090 REM LOCATE CURSOR
1100 POSITION 4,10
1110 REM WAIT MESSAGE WHILE DRAWING
1120 REM PLAYER/MISSILE GRAPHICS
1130 ? #6;"PLEASE WAIT"
1140 A=PEEK(106)-8:POKE 54279,A
1150 PMBASE=256*A:POKE 559,46
1160 REM CLEAR GRAPHIC MEMORY BY LOADING WITH ZEROS
1170 FOR I=PMBASE+512 TO PMBASE+1024:POKE I,0:NEXT I
1180 REM DRAW BOXES 8 BITS WIDE BY 70 BITS TALL
1190 FOR RED=PMBASE+528 TO PMBASE+598
1200 POKE RED,255:NEXT RED
1210 FOR BLUE=PMBASE+656 TO PMBASE+726
1220 POKE BLUE,255:NEXT BLUE
1230 FOR GREEN=PMBASE+784 TO PMBASE+854
1240 POKE GREEN,255:NEXT GREEN
1250 FOR YELLOW=PMBASE+912 TO PMBASE+982
1260 POKE YELLOW,255:NEXT YELLOW
1270 REM SET WIDTH OF BOXES
1280 POKE 53256,1:POKE 53257,1:POKE 53258,1:POKE 53259,1
1290 REM LOCATE BOXES HORIZ. POSITION
1300 POKE 53248,90:POKE 53249,110
1310 POKE 53250,130:POKE 53251,150
1320 REM TURN ON GRAPHICS
1330 POKE 53277,3
1340 RETURN

```

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bits across. Lines 1300 through 1310 place the boxes at their horizontal positions. Line 1330 gives the final signal to turn on the graphics.

Meanwhile, back at the top of the program: line 170 prints the skill level message and the micro waits at line 200 for the choice. When a key from 1 to 5 is typed, that key's ASCII code is compared to the table in lines 230-270. The appropriate skill value will be placed in the delay loop that

determines how long the color bars will be on-screen. Line 290 routes you to the beginning of the main program loop.

Line 640 picks a random number, any number between 1 and 4. That number is given a number. The first number will be between 1 and 4 and will tell the program which of the four colors, (red, blue, green or yellow) to display. The second number, which keeps track of each color

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in the sequence, is assigned in each turn by line 690. With a color chosen, and having told the computer where it is in the sequence, the program jumps to line 300.

Lines 300-410 hold the program loop where all the colors in the sequence so far are flashed on the screen. You will see all the previous colors you have remembered and keyed correctly plus one addition to the pattern.

Lines 470-600 will test your memory of the sequence.

As each color comes up on its turn, lines 320-410 will send the program to the subroutine that paints that color. There are four such subroutines: lines 720-770, 780-830, 840-890 and 900-950. Once at one of these subroutines, the program will paint the bar either red, blue, green or yellow. Then comes the musical note. Color and note are delayed for as long as was specified in the skill level. After

If you enter a color  
out of sequence,  
the program lets you know  
you aren't as quick or  
as smart as you once were.

the delay is satisfied, the sound is killed and the bar is painted black, then it's back to the main loop for the next color bar.

The loop knows how many colors were flashed on the screen and will wait for that many keystrokes. Each keystroke will be matched against the proper sequence. If you enter a color out of sequence, the program lumbers off to the Blunder routine to let you know you aren't as quick or as smart as you once were.

The Blunder routine, lines 1000 through 1070, shuts off the keyboard, plays a sour note, clears the value of all variables to zero and starts the game over.

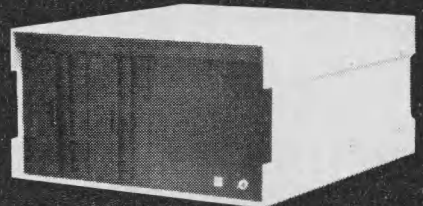
However, if you haven't yet goofed, the game will continue randomly adding color bars to the sequence.

One thought—why not close both eyes and play by ear? Can you recall the sequence of musical notes? How about manual dexterity? Where is that R? Here's where you try out the computer Zen I mentioned earlier, remembering what you "saw" with your mind's eye, reaching out with that inner sanctum of gray matter that we little understand and so much crave to master. ■

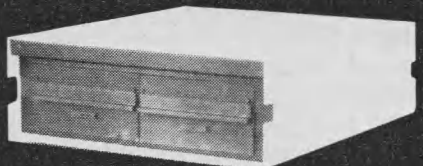
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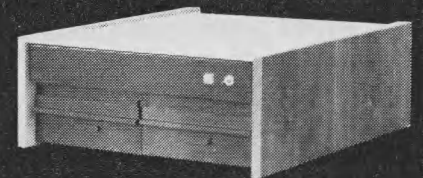
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# Multi-User Systems— What a Sharing Spirit Abounds!

by G. Michael Vose  
Microcomputing Technical Editor

**M**ulti-user operating systems pre-date the microcomputer by a dozen years or more. But the advent of 16-bit microprocessors has focused attention on these sophisticated operating systems for the newest generation of personal computers. While multi-user capability has been implemented on the more powerful of the eight-bit machines, the 16-bit machines are spurring the growth of true multi-user microcomputer systems.

Author Mikael Blaisdell examines the theory of operation of multi-user operating systems in the article starting on p. 58. The following is a brief definition of many of the terms and concepts that comprise the field of multi-user operating systems.

---

These new processors  
are so powerful that  
they practically demand a  
multi-user implementation  
to make their use efficient.

---

Multi-user operating systems are highly complex and consequently use a great deal of memory. Since 16-bit microprocessors can address larger memories—and operate faster—they

provide a realistic environment for multiple users. In fact, these new processors are so powerful that they practically demand a multi-user implementation to make their use efficient.

What is a multi-user system? It is obviously more than simply sharing resources like hard disks and printers. The fundamental definition of **multi-user** is permitting more than one user to use the system. But the definition must be broadened to specify that each user can be working with a different program, or they can all be using the same program, but each user will seem to be the only user on the system. Additionally, a good multi-user operating system provides security to prevent unauthorized use of files.

This definition of multi-user contrasts to two other kinds of computer operation. **Multiprocessing** is a technique allowing two or more programs to run in the computer at the same time, each with its own place in memory, but each using its own central processing unit (CPU). **Multi-tasking** is the programming technique that allows two or more programs to operate in the same computer, all sharing the CPU and memory. From multitasking, it is only one step up to multi-user systems; a multi-user system is a multitasking computer used by two or more users.

Multi-user systems share all resources—memory, CPU, disk storage, printers and all other peripherals. Systems in which each terminal has its own CPU and memory but shares resources like printers and disk storage are involved in distributed processing or networking. This kind of system is *not* a multi-user system because the CPUs are not shared.

Operating System	Company	CPU
BLMX-80	National Semiconductor, 2900 Semiconductor, Santa Clara, CA 95051	8080, 8085, Z80, NCS800
Unix	Bell Labs	68000, Z8000, 8086
IDRIS	Whitesmiths, Ltd., 127 East 129th St., New York, NY 10022	68000, 8080, 8085, Z80
Oasis, Oasis-16	Phase One Systems, 7700 Edgewater Drive, Oakland, CA 94621	8080, 8085, 8086, 8088, Z80
Zeus	Zilog, 10460 Bubb Road, Cupertino, CA 95014	Z8001
Xenix	Microsoft, 10800 NE 8th, #819, Bellevue, WA 98004	68000, 8086, Z8000
MP/M II, MP/M 86	Digital Research, Box 579, Pacific Grove, CA 93950	8080, 8085, 8086, 8088, Z80
UNOS	Charles River Data Systems, 4 Tech Circle, Natick, MA 01760	68000
OS9	Microware Systems Corp., 5835 Grand Ave., Des Moines, IA 50312	6809
Turbodos	MuSYS, 1752 B Langley, Irvine, CA 92714	Z80

Table 1. Multi-user operating systems.

The purpose of a multi-user system is to make the most efficient use of CPU time. Since most business applications involve a great deal of keyboard activity, the CPU spends a lot of time waiting for relatively slow humans to give it the data it needs for processing. By allowing multiple users, the CPU is occupied more often.

Since it is important that users not be kept waiting when performing their individual tasks, a multi-user operating system must be a **real-time** system. This simply means that it must use a sophisticated module to assign priorities and schedule the multiple tasks that the CPU must perform. This module must accomplish this flow so that each user will appear to be the only user on the system. The operating system module that performs this scheduling is called a **real-time multitasking executive (RME)**.

Some multi-user operating systems are written to run on a variety of microprocessors, but most run on a single CPU or a family of processors. MP/M, for example, runs on the Intel 8080 family of processors as well as Zilog Z80 CPUs. Table 1 shows the currently available multi-user operating systems and the microprocessors they were designed for. (For a detailed discussion of the difference between multiprocessing and multitasking, see "Which Multi-User Approach?" June 1981 *Microcomputing*, p. 34.)

In future issues of *Microcomputing*, we plan to cover some of these multi-user operating systems in depth. As the microcomputer continues to prove itself adaptable and cost efficient, more offices, schools and labs will incorporate the machine into their environments. Multiple users will probably become the norm in these institutional settings.

\*\*\*

In addition to its continuing aggressive support of the CP/M operating system and the Microsoft Basic programming language, *Microcomputing* intends to increase its support of the IBM Personal Computer. We are seeking manuscripts covering both hardware and software topics as well as applications of IBM PCs. If you are interested in writing for *Microcomputing*, send for our Submissions Style Guide. Address your correspondence to Michele Christian, 80 Pine Street, Peterborough, NH 03458. ■

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# The Great OS Debate

*Which multi-user operating system will you be using in the future?*

By Mikael Blaisdell

**T**he battle of the operating systems: To the uninitiated, it's an exercise in confusion. To the experienced programmer, it involves a large selection of varying worth. To the microcomputer sales team, it's a bewildering array of promise and pitfall. And to the software house, it's a serious question of direction.

Your evaluation of the microcomputer business software market of today largely depends upon your point of view, and also upon your audience. What is needed is some sort of standard to be used in judging the worth of the multitudes of offerings of applications and systems software for business purposes.

Several standards have been proposed by various groups and interests. One would have us measure systems software by an "industry standard," such as CP/M. Others suggest that software should be measured by its number of end-users. Again, the standards you choose will reflect your point of view.

So let's examine one segment of the business microcomputer software market—operating systems—from the points of view of the end-user, the applications programmer and the salesman.

Three major contenders in the business operating-system software market follow:

*CP/M and MP/M (80 and 86 versions)*—Produced by Digital Research of Pacific Grove, CA, CP/M is per-

haps the best-known of all of the contenders; it was also the first to be released. MP/M is a later multi-user version of CP/M. CP/M 86 is the 16-bit version of the software; likewise for MP/M 86. This group also includes all so-called CP/M-compatible offerings, such as CDOS, MS-DOS and Turbodos.

*Unix*—Created by Bell Labs as a development system, it's a toss-up as to which is better known between Unix or the language it was written in—C. Both were given away in source code form to various universities, resulting in the development of several distinct versions. Not available for eight-bit microcomputers, Unix is being proclaimed as the operating system of the future as it becomes available on a variety of 16-bit microcomputers. The Unix heading includes Xenix, Qunix and other look-alikes.

*Oasis*—Written by Tim Williams and distributed by Phase One Systems of Oakland, CA, the Oasis family is available on a range of eight- and 16-bit microcomputer systems. It is not as well-known as either CP/M or Unix, but enjoys a committed following among diverse international groups.

There may be other contenders lurking about in the marketplace, but these three will be the major forces in the foreseeable future. I have grouped the CP/M systems together under the banner of "CP/M-compatible" due to the fact that most advertising for software packages for such operating systems seems to stress the compatibility issue.

## The End-User

The standards for evaluation used by purchasers and operators of mi-

crocomputer business operating systems will center around the issues of user-friendliness, application software availability and ongoing support. User-friendliness is perhaps the most misleading label, for virtually all of the makers of the various contenders claim user-friendliness as an attribute of their particular system.

The CP/M group seems to offer the most to the end-user in the area of software availability. User-friendliness, though, is poor, and ongoing support for the end-user is difficult to obtain. The strongest indication of the lack of user-friendliness of CP/M is shown by Digital Research's longstanding refusal to improve the documentation of the system.

The Unix family is weaker than the CP/M group in both user-friendliness and support. Software availability for business users of Unix is next to nonexistent, although manufacturers of Unix systems are currently writing programs that will allow CP/M software to be used on their versions of Unix.

From an end-user's point of view, the Oasis group boasts the best documentation of any of the contenders. The reference manual has examples of typical uses for the various utility programs and system elements. Furthermore, it is the only operating system specifically designed for business use by inexperienced operators. And there's less software available for Oasis than there is for CP/M (although there's more software available for Oasis than there is for Unix).

## The Applications Programmer

The applications programmer tends to evaluate operating-system software in terms of the available

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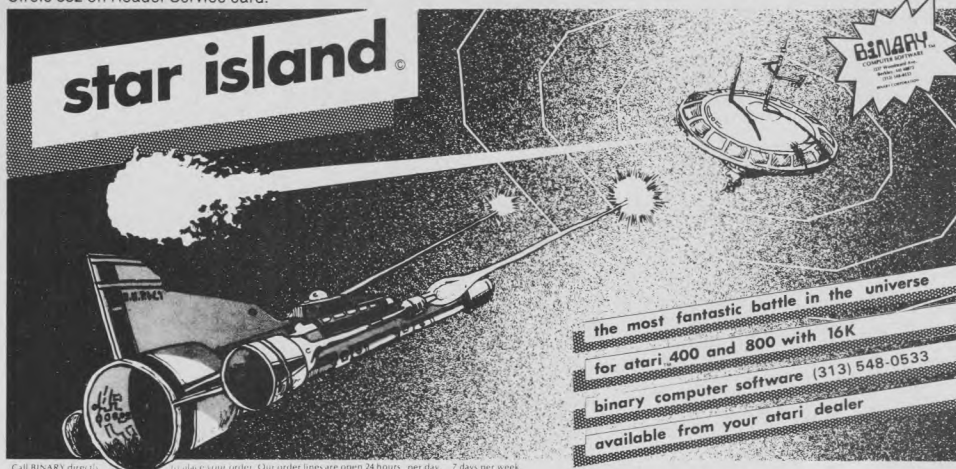


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programming tools, the system support and the machine portability and compatibility.

CP/M scores high for machine portability and compatibility, offering the widest range of potential installations at first glance. However, since the various manufacturers of CP/M-compatible systems have not attempted to maintain absolute compatibility across the range of available hardware and implementations, the programmer who assumes that what runs on one will run on them all may be in for a surprise.

The programming tools are marginal, and the lack of a built-in file structure makes file-handling and error recovery a sore point among programmers.

Unix and its clones score well with the programmer set. The programming tools are praised, while the lack of built-in file structures is compensated for in the overall power of the operating system.

Unix can be said to have been written by programmers for programmers to use. The lack of user-friendly features is of much less importance

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By Ken Pedersen

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*Address correspondence to Ken Pedersen c/o Microcomputing.*

*(continued on page 62)*

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when the user is experienced.

Drawbacks include a current lack of a wide base of microcomputers using the system, although this may change with the advent of the 16-bit microcomputers.

The Oasis system's programming tools are effectively done, and those features that a business operating system should have are already present. The file structure is built-in, as is a comprehensive error message set. Any system utility program or job control language program may be called from the application program.

The installed user base is not as large as CP/M's, but Oasis handles all data protection functions so that there is no difference to the programmer between single and/or multi-user versions of his program. And, if the programmer writes tight code and keeps the module size low, what runs on one Oasis system can be guaranteed to run on them all.

### The Salesman

The salesman finds himself caught in an uncomfortable position between the end-user and the applications programmer. If he sells the end-

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The Unix market is currently somewhat small, although, with the advent of 16-bit computers, it promises to grow significantly.

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user the "white-sidewall tires, all-electric kitchen, two-tone paint, CP/M-compatible 16-bit personal computer" as requested, he knows that the end-user is not likely to learn to operate the computer immediately. However, it's difficult to persuade the average end-user that he will be better off in the long run with a different computer than with what he originally asked for.

The bottom line for the salesman is the sale; his standards, therefore, center around the selling qualities of the system, with much less concern toward the suitability or "supportability" of the computer.

CP/M offers the salesman a readily-

recognizable name value; he can use terms like "industry standard" in selling to his customers. A large number of software packages are available for CP/M systems, and even some name values are known on the applications program level. VisiCalc is perhaps the most notable example of this.

The sales, therefore, are relatively easy to produce and the market appears steady. The difficulties lie in the area of user-friendliness and support. Without considerable training, the inexperienced user may be lost, and may not be a candidate for repeat sales.

The Unix market is currently somewhat small, although, with the advent of 16-bit computers, it promises to grow significantly. The salesman again sees the name value, but this time there is no readily-available software base to assist sales.

Those manufacturers that are writing emulator programs to allow use of CP/M programs are attempting to rectify the absence of software, but this raises more questions than it answers. For example, why buy an even more unfriendly operating

(from page 61)

ters it into the computer. Our first operator now believes that there is a seat available on the flight, when it really no longer exists.

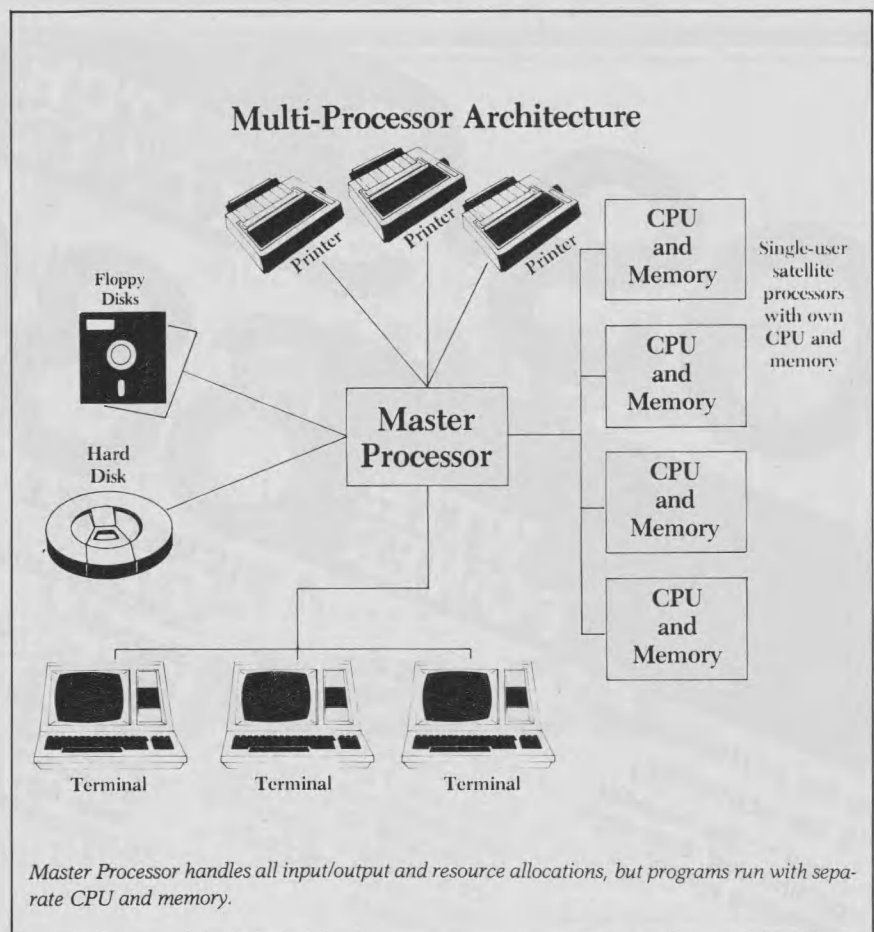
What happens now if our unsuspecting first operator tries to sell that now nonexistent seat? Unless the system knows specifically how to deal with the situation, the results will be unpredictable. We do not know for certain what has happened to the data file, and therefore the file no longer has integrity.

As you can see, a single-user computer will never have this problem because there will never be more than one operator using the system at any given time.

The most simple solution is to assure that, in the environment where the computer will be used, each user station is assigned a specific function that only it will perform.

This is, however, not always practical. Perhaps it is desirable to run a single program in a multi-user environment where more than one user will be updating the

(continued on page 64)



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system when the programs will already run on an existing one? Again, though, the critical point will be what the customer asks for.

The Oasis community presents some hard choices to the salesman. The name value isn't present for the average buyer, and there are few name brands among the applications software packages that are available. This situation has been slowly changing as the average buyer becomes more aware and as Oasis becomes better known, but the rate of change has been very slow.

### Soothsaying

The next few years probably won't see any one of the contenders reach a

The few drawbacks  
of CP/M and Unix  
are compensated for  
by the reputations they've  
built over the years.

dominant position in the marketplace. The few drawbacks of CP/M and Unix are compensated for by the reputations they've built over the years.

The virtues of the Oasis family are likewise offset, to a degree, by the fact that it does not enjoy the grassroots awareness of its competitors. However, Oasis should become better-known as the end-user base becomes more experienced and sophisticated. A critical factor will be the exceptional speed of expansion in the market. It'll simply be too large for any one system to cover all of the available bases.

The home and hobbyist computer market, long the exclusive domain of CP/M, will probably remain so. The low end of the business market, single-user based, will likely be characterized by small machines and some form of CP/M.

However, as the size of the business becomes larger, and the computer attains multi-user compatibility, the CP/M systems will begin to be much less prevalent while Oasis- and Unix-based systems become more common. At the highest end of the business microcomputing market, competition between Oasis and Unix should become intense. ■

(from page 62)

same file (for example, a sales order entry system). In this case, the computer itself must safeguard the integrity of the files.

Some vendors of multi-user systems have supplied their computer's operating system (the computer program that controls the computer's resources) with a "record-locking" capability. Most simply stated, record locking means that, when data (or records) are being updated, no other user can slip in and change the data during the update. This prevents the problem we have been discussing and gives data integrity.

### Still Not Sufficient

Unfortunately, after saying these things, there remains one last problem. The mere presence of the record-locking capability in an operating system does not mean that the application program actually uses that capability.

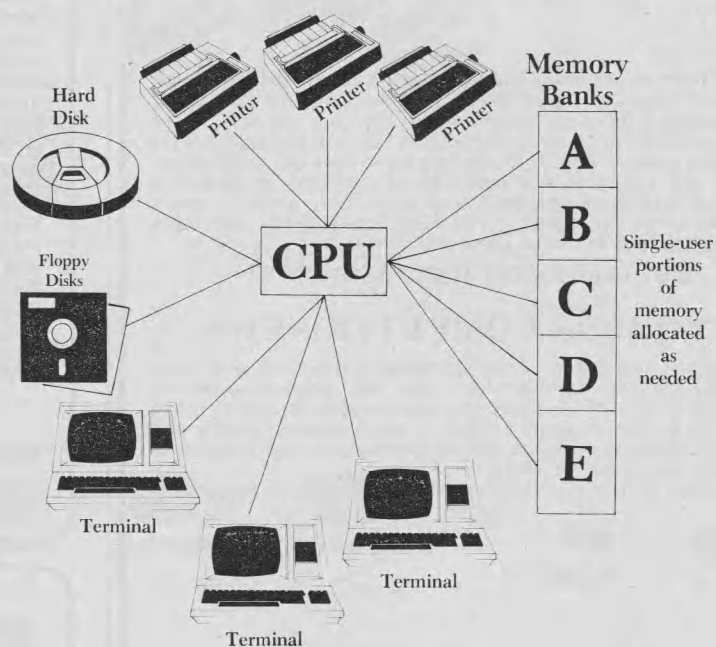
Similar to a parachute, the record-locking feature gives little benefit until it is actually used by the application program. If the pro-

gram is not specifically designed to use the operating system's particular record-locking capability, this feature gives no protection. Thus, when making a software decision for multi-user systems where record locking is an issue, it is necessary for the prospective buyer to make sure that the application programs as well as the operating system offer and implement the record-locking feature.

Does this mean that all your software must implement record locking? No. For example, word processing usually does not require it because it is unlikely that there would be a need for having two people edit the same letter simultaneously. When there are critical data files, however, and more than one user will have access to them, you must make the decision as to how you will deal with the integrity problem. Accounting packages that you might be familiar with on single-user systems could require modification or be entirely unacceptable because of their inability to work reliably in a multi-user environment.

(continued on page 66)

### Single Processor Architecture



One CPU services all resource allocations, input/output and processing requirements.



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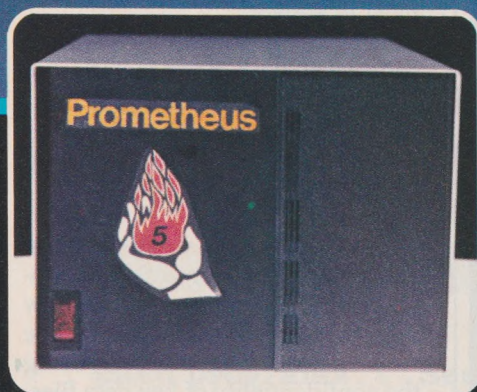


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(from page 64)

Proper backup of data is critical to all computer systems, but is especially important in a multi-user environment. More than one user is now depending on the system. You might have more data on the computer than a single-user system would have. Thus it is necessary to make sure that your multi-user system has an adequate backup mechanism other than a floppy disk.

Why not a floppy-disk backup? Let's step back briefly. The system you choose will most likely use a hard disk as its storage medium. Hard disks can hold much larger amounts of data and are also much faster. This benefits the user in two ways. First, users avoid having to run back and forth, switching relatively low-capacity floppy disks in and out of the machine. Also, hard disks are much faster than floppy disks, and, with the possibility of simultaneous requests for data, floppy disks generally give too slow a response to be considered

effective.

Keeping these facts in mind, it can take up to 40 floppy disks to back up a medium-volume (20 megabyte or 20 million characters of memory) hard disk. This method can take up to several hours, be difficult to manage properly and is impractical.

Cartridge-tape-backup mechanisms, on the other hand, cost less (approximately \$2000 to \$4000), are reliable and can back up in 15 minutes the same hard disk that took 40 floppy disks and two hours. For this reason, a backup method similar to cartridge-tape backup should be written in as a part of the minimum cost for the system. The possibility of vandalism, sabotage or mechanical failure makes this extra precaution a good and necessary investment.

### Security Considerations

The last issue we will consider here is one that is often overlooked when purchasing a multi-user computer—the issue of software security. The problem of security is simple: how to give users of the computer the power they need to perform the specific functions they are responsible for, without allowing them access to capabilities and sensitive data files that they do not need to have.

Some of the capabilities we are concerned with here include the ability to do the following:

- Delete files from the disk unit.
- Modify files, such as payroll or payables.
- Rename files.

As we have seen, multi-user systems have the cost-saving advantage of sharing resources. But now we see that we must have some way of protecting and controlling the confidentiality of key data files, as well as prevent others from unknowingly or maliciously invoking powerful operating system commands that will be harmful to the integrity of the system in general.

One way to protect the security of the system is to purchase application programs that have a security feature built into them. In this type of arrangement, the user must type in a password to the program after invoking it and is not allowed access to the program if he cannot supply the correct code.

This solution, however, is not ideal. First, not all applications have password support. Second, it is often relatively easy for a person with some programming knowledge to outsmart this kind of device and gain entrance to the program without knowing the password. Thus, the password protection becomes little more than a temporary annoyance for the individual who is really determined to get access to the information. Finally, password protection of application programs does not address the critical problem of restricting the availability of powerful operating-system commands to the unqualified user.

Therefore, a better solution is to implement the password protection on the operating-system level, instead of the application level.

Operating-system-level protection refuses the user access to the computer system in general until he enters his personal password. This password is given to the user by the person responsible for the computer installation. This person determines what capabilities each user of the system will need and what programs the user should be able to use. The password tells the operating system what kinds of programs the user should be allowed to use and the kinds of system commands that the particular individual may use.

Thus, when an individual logs on to the computer, the system automatically knows the limitations that it will impose on the particular user. The data-entry operator will be allowed access to the data-entry program only and not be allowed to delete files, thus ensuring that the system is secure.

While no system is foolproof, this method seems to be better than the previous one discussed. It is much more difficult to break into, and the user need know only one password, as opposed to remembering a password for each program. Unfortunately, not all multi-user systems offer this type of sophisticated operating-system security feature. Prospective buyers need to measure their particular security needs in light of the systems that they are considering. ■

(Excerpted with permission from Desktop Computing, December 1982, p. 48.)

Circle 283 on Reader Service card.

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# Flick Your Switcher

*Build this simple add-on that changes PET/CBM character sets at the flick of a switch. No cutting or soldering on the computer is required.*

By Louis F. Sander

One of the best features of the PET/CBM computer is its ability to switch between two character sets.

One character set has upper and lowercase letters, the usual numbers and punctuation and more than 30 special graphics characters. In the other set, the lowercase letters and four other characters are replaced by graphics.

A direct- or program-mode Poke to memory location 59468 determines which character set is active at any given time.

Program control of these character sets, each having over 250 characters, lets the PET/CBM owner create screen displays that even an Atari can't match. But when the computer is in direct mode, using Poke commands to change character sets is in-

convenient, especially if repeated switching back and forth is necessary.

The problem is well-known to anyone who has listed a program when his computer has the wrong character set enabled. But there's a way around it—the Switcher.

The Switcher is a PET/CBM add-on which changes character sets at the flick of a switch. It consists of a modified IC socket connected to a three-position toggle switch.

One switch position allows normal program control of the character sets, while the other two lock the computer into one character set or the other. The switch can be mounted in any convenient place on your computer and the socket fits between the 6522 VIA (versatile interface adapter) and its normal socket.

A study of Commodore schematics indicates that the Switcher can be used on any PET or CBM, although I've only tested it on my small keyboard PET (where it has worked perfectly for more than a year) and on an upgrade-ROM PET 2001/8N.

The Switcher's theory of operation is simple. Pin 39 of the 6522 drives a control line which determines the active character set; it enables one set when high and the other when low. Pokes to 59468 determine the state of pin 39.

The Switcher breaks the connection between pin 39 and the control line (Fig. 1), and the switch determines whether the control line is high, low or connected back to pin 39. The miniature jack shown in Fig. 1 is an optional pickup of the CB2 sound line, which originates on the 6522 VIA. The jack also helps stabilize the Switcher during construction.

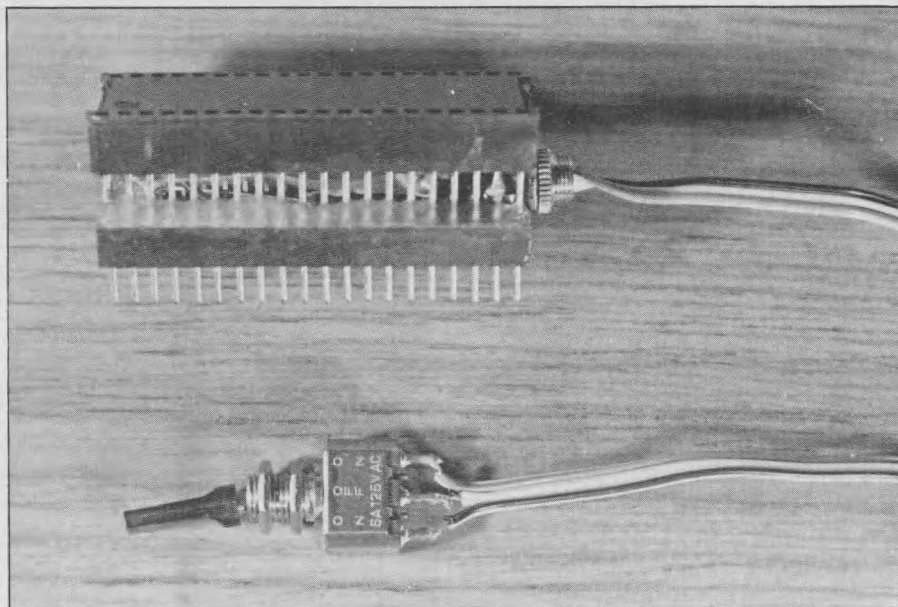
## Putting It Together

In the assembled Switcher, the pins of a wire-wrap IC socket are inserted through the empty holes of a de-pinned low-profile socket and glued into place, with the resistor and all the wiring in between the two sockets. Pin 39 is cut between the plug end and the socket end, and appropriate connections are made in between.

The resulting unit can be plugged into one of PET's IC sockets, with the IC in turn being plugged into the unit.

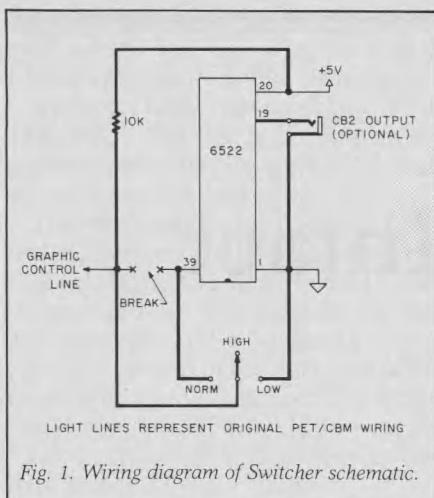
Putting the Switcher together is somewhat delicate, so step-by-step instructions follow:

1. Pull all pins out of the low-profile



*An assembled version of the Switcher.*

Address correspondence to Louis F. Sander, 153 Mayer Drive, Pittsburgh, PA 15237.



socket, leaving only the plastic shell.

2. Connect three 12-inch wires to the switch, carefully marking the one attached to the rotor of the switch.

3. Cut off all but 1/16-inch of pin 39 of the wire-wrap socket and save the cut-off pin.

4. Take the cut-off pin and carefully shorten it by 1/32 to 1/16 inch. Now carefully solder the rotor wire from the switch to one end of a 10k resistor, keeping everything as close to the cut end as possible.

5. Insert this pin into pin 39 of the low-profile socket, allowing its uncut end to protrude to the length of a pin on an IC. It is best to use another socket as a gauge for this distance. Using fast-setting epoxy, glue the pin into place.

6. Solder one of the other wires from the switch to the stub of pin 39 on the wire-wrap socket, keeping it as close to the socket as you can.

#### Parts List:

SPDT Center OFF Toggle Switch  
10k 1/4 Watt Resistor  
40-pin Wire-Wrap IC Socket  
40-pin Low-Profile IC Socket  
Open Circuit Miniature Jack, Enclosed Type  
Hookup Wire

Radio Shack 275-325  
Radio Shack 271-1335  
Jim Pak 40 Pin WW  
Jim Pak 40 Pin LP  
Radio Shack 274-297  
Radio Shack 278-757

7. Solder the remaining switch wire to pin 1, also keeping it close to the body of the socket.

8. Using the same positioning technique, solder the other end of the 10k resistor to pin 20. If you want a CB2 jack, put it in now.

9. Carefully insert the wire-wrap socket into the low-profile shell so the pins protrude as far as the one you glued in step 4. Be sure that the lower and upper halves of pin 39 do not touch, and glue the remaining pins into the shell. Use your other socket as a gauge here, too, and be careful to keep the glue away from the wire-wrap pins where they will plug into the IC socket on the PET.

When the glue has dried, double-check your wiring, check for shorts and you're ready for a test. There is a caution at this point. Since the pins on the Switcher are larger than those on an IC, it might be difficult to insert them the first time.

The pins will probably deform the socket's tiny contacts a bit, which may keep them from working properly with a plain IC. So once you plug in your Switcher, you may not be able to use that socket for a plain IC again. This is not a major problem, since

your Switcher will occupy that socket forever, but you should be aware of it.

#### The Test

Locate the 6522 inside your PET and take note of the position of pin 1. Carefully remove the 6522 by prying it gently from both ends and plug it into your Switcher, making sure that pin 1 is plugged into pin 1.

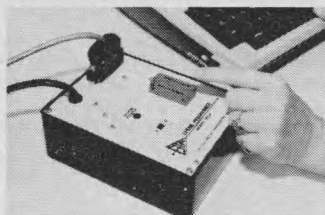
Then, retaining your close watch over pin positions, plug the whole assembly into the 6522's former socket on your PET. You'll have to use controlled force to get all 40 pins into the socket, but they will go in—just be careful and persistent.

Once everything is together properly, turn on your PET and put a few shifted and unshifted alphabetic characters on the screen. Toggle your Switcher's switch through all three positions and observe the results.

One position should always show letters, one should always show graphics and one should respond to Pokes to 59468, which you'll never need to make in direct mode again. Stand by for more enjoyable computing in the future, courtesy of the Switcher. Mine has been among the most useful add-ons I've tried. ■

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# Keep Your Text Intact

*Here's a routine that allows split screen scrolling on your Heath/Zenith-89.*

By Mark W. Smith

**H**aving seen and used sophisticated software that allows split screen work, I finally decided to develop this procedure for myself.

The key to my split screen scrolling is Heath/Zenith's cursor control functions, which are listed in the *Operation/Service Manual* under "Escape Sequences." As was mentioned in Joseph Hesse's article in the February 1982 issue of *Microcomputing*, you can control the cursor's position on the terminal's screen by combining two ASCII characters and sending them to the terminal.

Although Mr. Hesse's routines were written using Microsoft Fortran, the idea of combining ESC and another character code applies when using Microsoft Basic, the language I use most often. By using just the right combination of these codes with the proper line punctuation between commands, I was able to develop a routine to allow for split screen scrolling. The routine in Listing 1 can be modified for various applications.

## How It Works

The basic idea behind this routine is to print several lines (column or title headings, lines 80-130) at the top of the screen, some repetitive data lines (line 280) and some closing lines at the bottom of the screen (line 350). Then, by use of the white special-function key, write another line of data at the bottom of the data line area on the screen (lines 440-500).

Each time you depress the white special-function key (line 450), a new line of data will appear at the bottom of the data area. This will shift the top line of data off the screen, but the column or title lines will remain unaffected. Thus you will be able to scroll through your data and maintain a top and bottom display that will stay on the screen, instead of having the top line on the screen scroll off once a new line has been added (providing, of course, the screen was filled from the top).

Starting with line 460, the cursor re-

turns to the top of the data area and deletes the top data line. The cursor is then positioned at the bottom of the data area. A data line is printed, causing all the data lines to scroll up one line. This fills in the deleted line space, without forcing the title/heading lines to scroll off the top of the screen. In my example, line 480 updates the summation line.

As you can see, you must know certain values or at least keep track of the line number where the cursor started and stopped writing the data area on the screen. There are a number of

Listing 1. Split Screen Scrolling program for the Heath/Zenith H/Z-89 microcomputer.

```
10 REM          SPLIT SCREEN SCROLLING BY MARK W. SMITH
20 REM
30 REM *****
40 REM *****CLEAR THE SCREEN AND PRINT THE TITLE OR COLUMN HEADINGS*****
50 REM *****
60 REM
70 READ S$,SN,ST$,SP$
80 PRINT CHR$(27);"E";
90 PRINT "SALESMAN NAME: ";:PRINT USING "\          \";S$;
100 PRINT SPC(5);"SALESMAN NUMBER: ";:PRINT USING "#####";SN
110 PRINT "SALESMAN TERRITORY: ";:PRINT USING "\          \";ST$;
120 PRINT "SALESMAN PHONE : ";:PRINT USING "\          \";SP$
130 PRINT "*****";:@
    PRINT "*****"
140 REM
150 REM *****
160 REM *****SAVE CURSOR POSITION FOR LATER AND SET X1 TO THE NUMBER OF*****
170 REM *****LINES DOWN YOU PRINTED*****
180 REM *****
190 REM
200 PRINT CHR$(27);"j";
210 X1=3
220 REM
230 REM *****
240 REM *****PRINT OUT REPETATIVE DATA IN THE DATA AREA ALLOWING ANYWHERE*****
250 REM *****FROM 1 TO NO MORE THEN 21-X1 DATA LINES ON SCREEN*****
260 REM *****
270 REM
280 FOR Y1=1 TO 18:PRINT "THIS WOULD BE A DATA LINE";Y1:NEXT Y1
290 REM
300 REM *****
310 REM *****PRINT OUT THE SUMMATION OR ENDING LINE(S) WHICH WILL REMAIN *****
```

More

Address correspondence to Mark W. Smith,  
3001 Lakeshore Drive, Apt. 240, St. Joseph,  
MI 49085.

ways this can be accomplished; whatever means you use is up to you. I used a loop, for ease of explanation.

By using numerous trial and error attempts, I was able to develop an algorithm that seems to work in almost all cases (see the end of line 460).

The Heath sequence code for positioning the cursor is ESC Y1c, where 1 represents the line number and c the column number. The algorithm in line 460 represents the positioning of the cursor at the end of the data area prior to printing a new data line. The number 31 represents the top of the screen. Y1 is the number of data lines in the data area.

The reason 1 is subtracted from Y1 is that the loop counter adds one more than the maximum limit when it runs through the loop (this is how it knows when to drop out of the loop). Thus Y1 is one unit too large. X1 (line 210) was set to equal the number of heading/title lines. To keep from overwriting or scrolling information off the top of the screen, I found that  $X1 + Y1$  could not be greater than 21 in my example.

Once the data has been completely displayed, in this case using the white special-function key for scrolling, the program drops out of the loop and ends. Of course, you could use other means of control instead of using a loop.

You can use this routine, as my example shows, in a program that lists

key data and column headings at the top of the screen. For example, you could list key data on a salesman. Then scroll the first group of data lines such as the salesman's sales accounts. The bottom line (line 350) could be a

Using the H/Z-89's  
cursor control functions  
will give many  
of your programs  
that professional look.

summation line containing a running total of these sales account lines.

After each new data line is scrolled onto the screen you can, by using the cursor control functions, come down to the summation line and print the new total in the same spot as the old one.

Using the H/Z-89's cursor control functions will give many of your programs that professional look. Experiment with these escape sequences to find many unique combinations you can use in your own routines. Use of the ideas presented in my program listing will help you split that screen and scroll. ■

#### Listing 1 continued.

```

320 REM *****ON THE SCREEN BELOW THE SCROLLING DATA LINES *****
330 REM *****
340 REM
350 PRINT CHR$(27); "Y5 "; PRINT "SALESMAN TOTAL SALES ARE = "; :@
    PRINT USING "##,###.##"; Y1-1
360 REM
370 REM *****
380 REM *****PRINT OUT THE REST OF THE REPETATIVE DATA BY SCROLLING THE*****
390 REM *****TOP DATA LINE OFF THE SCREEN AND TACKING THE NEW DATA LINE*****
400 REM *****ONTO THE BOTTOM OF THE DATA AREA, KEEPING THE TOP AND *****
410 REM *****BOTTOM COLUMN/TITLE/SUMMATION LINES IN PLACE. *****
420 REM *****
430 REM
440 FOR Y=1 TO 5
450 AS=INPUT$(2):IF AS=CHR$(27)+"R" THEN GOTO 460 ELSE GOTO 450
460 PRINT CHR$(27); "k"; :PRINT CHR$(27); "M"; :@
    PRINT CHR$(27); "Y"+CHR$(31+Y1-1+X1)+" ";
470 PRINT "THESE WOULD BE ADDITIONAL DATA LINES"; Y1-1+Y
480 PRINT CHR$(27); "Y5 "; :PRINT USING "##,###.##"; Y1-1+Y;
490 PRINT CHR$(27); "L"
500 NEXT Y
510 END
520 REM
530 REM *****
540 REM *****THE DATA COULD BE READ FROM A DISK FILE OF SALESMEN'S DATA*****
550 REM *****AND THE DATA LINES INFORMATION COULD ALSO BE FROM A DISK *****
560 REM *****FILE. *****
570 REM *****
580 REM
590 DATA "JOHN HANCOCK",12345,"EVERYWHERE","555-1212"

```

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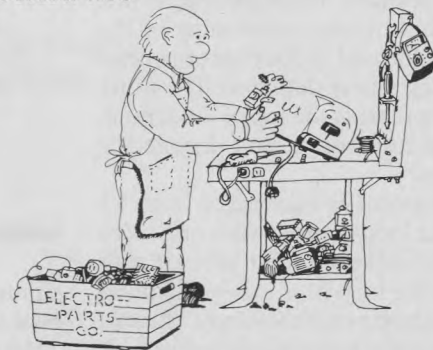


# The Intelligent Toaster

## or Experiments in Computer Control

*The author continues his discussion on designing and constructing touch circuits to input information.*

By Mark J. Robillard



After exploring ways of sensing touch with tactile methods (last month), here we delve into the use of the video touch screen for information input.

Numerous control and information panels will be scattered throughout your house as you begin working with tone signaling. Each of the panels will have to communicate in some way with the master Unimem controller.

When you add up all the switching, displaying and controlling possibilities, it tends to suggest either running a tremendous conduit full of signal wires or encoding the information and adding intelligence to the panel locally to decode it. I chose the latter.

If you're like me, you probably don't want to rip out your existing walls to install a transmission line. The fewer wires the better. So I tried serial digital information, but still found it to include at least five wires

(transmit, receive, power, ground and audio). Then I decided to utilize the audio line as a bidirectional link.

### What Type of Tones?

Voice output and input signals travel to and from each panel. By using audible tones to indicate control functions, you can use the same line. The question is: What type of tones should be used?

I experimented with a tone/no-tone serial data link and had some success at slow speeds. The circuitry responsible for this required several inexpensive IC packages. In an effort to avoid complexity, I came across the tone-signaling system used throughout the world on a daily basis: touch-tone.

For those who are unfamiliar with touch-tone, it was invented by Ma Bell for use in the telephone system.

It consists of tone pairs; each button on the tone keypad produces a unique

pair of frequencies that are totaled and output on the same audio line. Fig. 1 shows the 4x4 matrix keypad switch and the resulting tone pairs it will generate. For instance, if the 4 is pressed, both 1209 Hz and 770 Hz will be connected to the tone output line.

At the receiver end (Unimem), these tone pairs are separated and the higher frequencies (1209 to 1633) are sent to one set of decoders, and the low band (697 to 941) is routed to another set of decoder circuits.

The output of these, being a 2 of 8 code, depicts one of 16 control signals. Actual decoding circuits for touch tone will be discussed in a future article, when we construct the first part of the Unimem controller.

Touch-tone signaling has become so popular that a multitude of ICs are now available at reasonable prices. These circuits will do everything from scanning the 4x4 keypad to debouncing the switch contacts and transmitting the resulting tone pairs.

You'll notice that the 4x4 keypad in your home telephone has been cut down to 3x4. This is because the fourth column is used for special-purpose signaling in the phone system. We, however, will use all 16 buttons.

One of the easier-to-use single-chip touch-tone ICs to become available is the National Semiconductor MM53125. This is a 16-pin IC that operates off of a single +5 volt supply. It does require an external crystal to generate the tone frequencies, but it uses the most inexpensive crystal

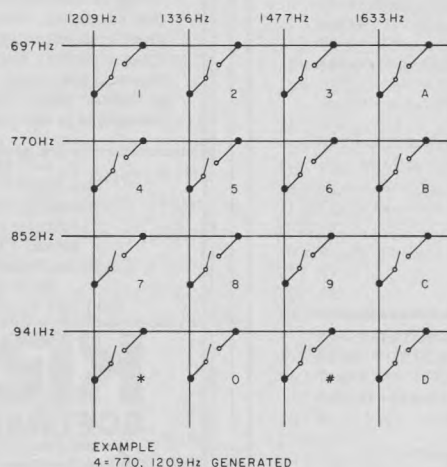


Fig. 1. Basic touch-tone 4x4 pad and associated tone frequencies generated.

Address correspondence to Mark J. Robillard, 3 Peach Lane, Townsend, MA 01469.

available.

The 3.579 MHz TV color burst crystal can be obtained virtually anywhere, including from Radio Shack. In fact, the MM53125, fully interfaced and connected to a compact 3x4 keypad, is also available from Radio Shack (part no. 277-1010; the corresponding crystal part is no. 272-1310).

Each one of my panels incorporates

the tone pad (Photo 1), or at least its IC.

More specifically, each panel has different functions that must be selected. I have assigned key labels to each of the touch-tone buttons. In this system, there may be more keys than 0-9. These keys can be used to call up various operating programs.

The labels on the tone pad change depending on the function selected.

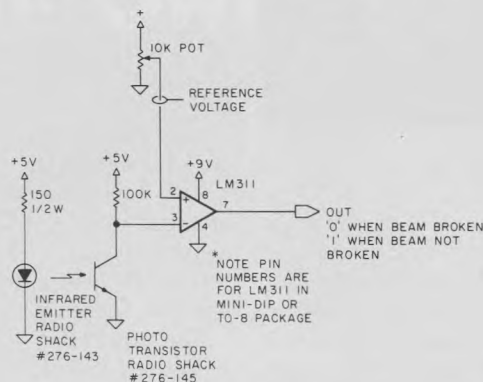


Fig. 2. Basic optical switch. Interruption of beam of infrared light between emitter and detector will cause the output of the comparator to activate. Adjust reference pot for sensitivity.

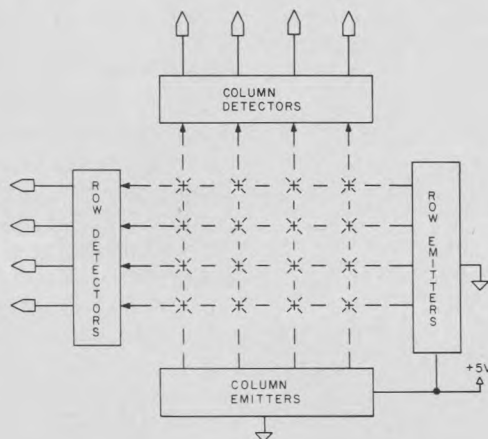


Fig. 3. Block diagram of 4x4 optical keypad.

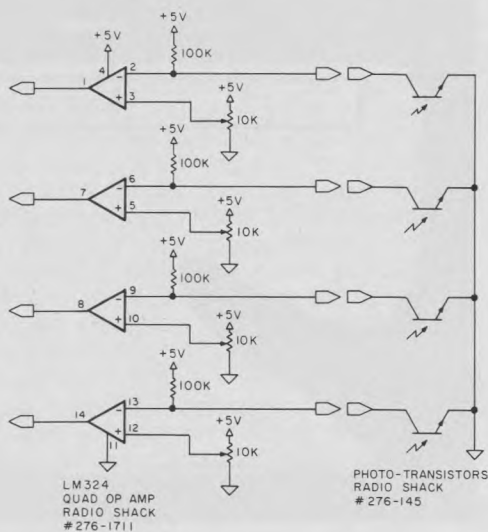


Fig. 4. Schematic of quad optical receiver.

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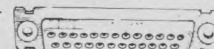


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To explain how this is done, we'll have to digress from signaling back to the one-eyed switch.

#### Four Eyes Are Better Than One

Remember how we were able to implement a switching function by simply interrupting a beam of light? Well, this technique comes in handy when you need a changeable font keypad.

Membrane and other switches are usually not clear, and the idea I wanted to portray was one where a small CRT screen (between five and nine inches) actually displayed the key legends, and the key switch mechanism was somehow attached over the face of the screen.

This required a transparent or semi-transparent switch. Membrane switch matrix products that have been used in this application are commercially available. However, the unit cost for one 8×8×5-inch switch is about \$900, which is a bit steep for me.

After deciding that Unimem will have a touch-tone signaling interface, it was apparent that all that was needed was a simple 4×4 matrix. Enter the optical keypad. Looking at Fig. 2, you see that the whole light-detection circuit is based on the use of a voltage comparator; however, you can obtain a 16-pin IC that has four of these circuits in it. The part number is LM324 from National Semiconductor (2900 Semiconductor Drive, Santa Clara, CA 95051).

A 4×4 optical keypad can be constructed electronically by using two of the LM324s and some discrete components.

The optics system resembles the block diagram in Fig. 3. It requires

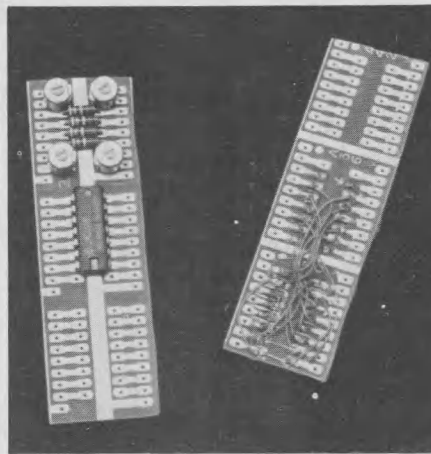


Photo 2. Quad optical receiver board of Fig. 4.

four-column optical transmitter/receiver pairs and four sets of row pairs. I built the receiver systems as separate boards for each direction. (Photo 2 shows the small card that contains the quad receiver circuit; the schematic for these cards is shown in Fig. 4.)

#### Mechanics

Having the necessary electronics for an optical keypad is only half the bat-

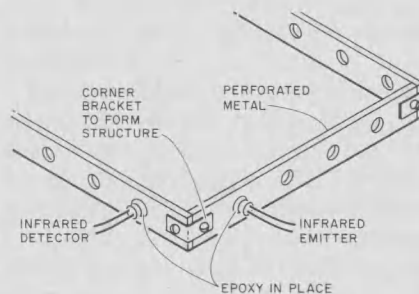


Fig. 5. Mechanical layout and construction of 4×4 optical keypad.

tle. You'll find out quickly once you separate the infrared emitter and detector by more than three inches that keeping them in a straight line is important.

This alignment problem can be the greatest source of headaches when implementing this system.

I used some aluminum extruded pieces that happened to have holes drilled at precise locations along the length of the piece. I mounted the emitter and detectors with an epoxy-like glue. The metal supports I used are probably not available commercially, but I found that Erector Set parts work just as well.

The basic dimensions of the 4×4 area are up to you. My system is designed for use with a nine-inch CRT screen; therefore, it's ten inches long and five inches high (Fig. 5).

The emitters are connected, along with their 150-ohm dropping resistor, on the frame (Fig. 6). It was intended that the keypad be mounted behind a panel in front of a CRT faceplate. Four holes may be drilled in the front of the unit to allow for mounting (Fig. 7).

#### Interfacing

You'll notice that the quad receiver boards output a 1 of 4 code, depending on which beam is being interrupted. Therefore, we end up with eight output lines, or 2 of 8. (Sound familiar?)

Let's take it a step further and connect the keypad emulator to the Radio Shack tone pad. Whether you intend to use both at the same time or to use one or the other, the circuit in Fig. 8 will emulate the action of a 4×4 keypad made of discrete switches. This is done by using analog switches, which

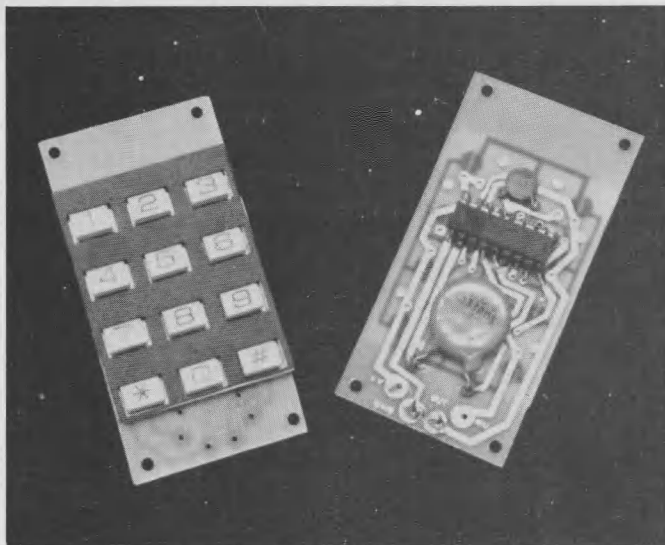


Photo 1. Radio Shack touch-tone pad.

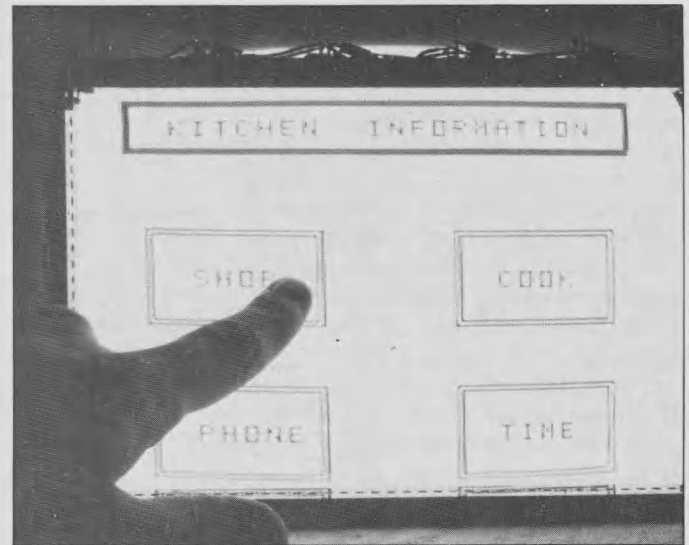
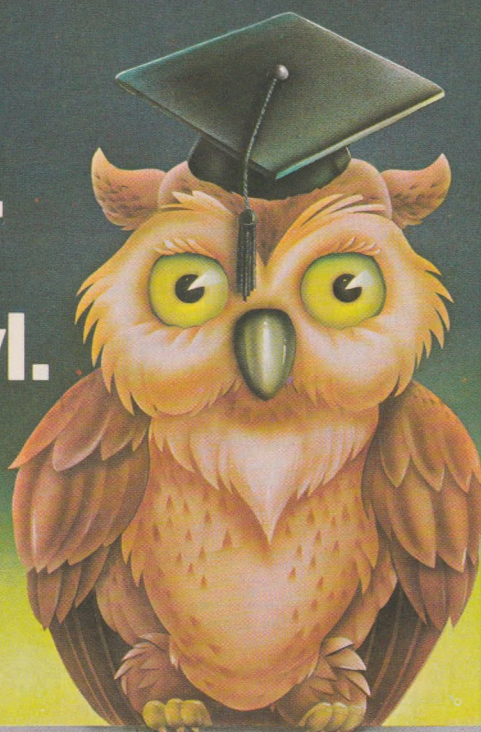


Photo 3. Optical keypad being used in conjunction with CRT.



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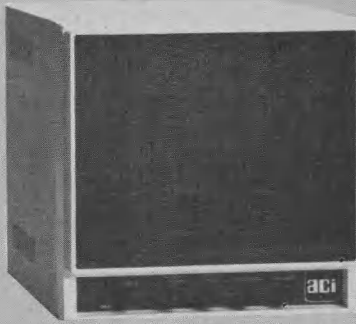
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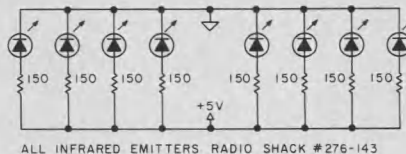
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act like tiny relays.

The 74LS148 should be familiar by now from the circuit (Fig. 9). When one of the four-column or row comparator outputs goes low, it activates a corresponding analog switch. The two (column and row) analog switches then connect together, forming the same action as a mechanical matrix (Fig. 10).

If you don't plan to use the key buttons provided on the Radio Shack tone pad, or if you want to use the MM53125 chip, there's an even easier



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Fig. 6. Schematic of infrared emitter circuits. Hookup is done right on the frame.

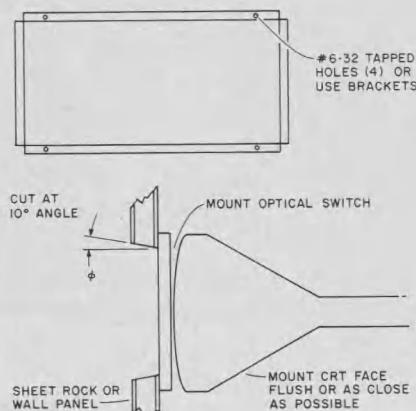


Fig. 7. Mounting details of 4x4 optical keypad.

way to connect the two. Fortunately, the designers of the chip anticipated the possibility of using an electronic circuit to activate the tone pairs.

Notice the input (pin 14 in Fig. 10) called KB control that is now grounded. If you perform the changes in connection shown in Fig. 11, you can eliminate the need for two CD4051 switches.

The XMIT input tells the chip that a valid tone code is on the row lines. This signal is provided by the 74LS148 in the form of a data strobe out of pin 14.

So what you have now, basically, is an optical touch-tone signaling system that can be mounted over the face of a CRT or TV tube. The legends shown on the screen have to line up with the optical beams. You can increase the amount of beams by constructing a unit that is not compatible with the Unimem system presented in this series of articles.

As I have said many times, each circuit or system I'll cover will have the ability to stand alone for other projects if you choose to go that route.

Finally, the circuits used in the optical 4x4 were not of the scanning nature depicted before. That doesn't rule out the possibility of scanning the receivers by selectively activating the emitters (Fig. 12). You can hook it up to your personal computer by using a flowchart (see *Microcomputing*, January 1983, p. 44, Fig. 5) to provide a scanning algorithm. Photo 3 shows the optical keypad, in actual use,

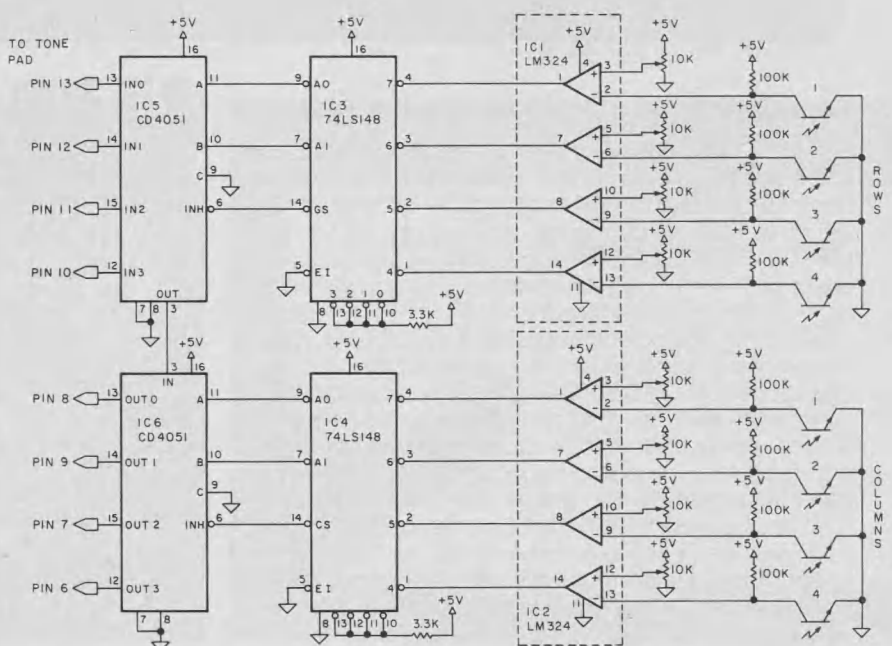


Fig. 8. Schematic of circuit to emulate 4x4 keypad. The optical receivers are shown in this drawing.

mounted before a nine-inch screen.

## Next Month

Throughout these past articles I have hinted on computer hookups and control without presenting much of anything on microcomputers. Next month we will explore the subject of single-chip intelligence.

Several commercially-available parts will be described with emphasis on the use of the Intel 8748. Learning to use these devices in local control situations will greatly advance you to-

ward the implementation of the intelligent home. ■

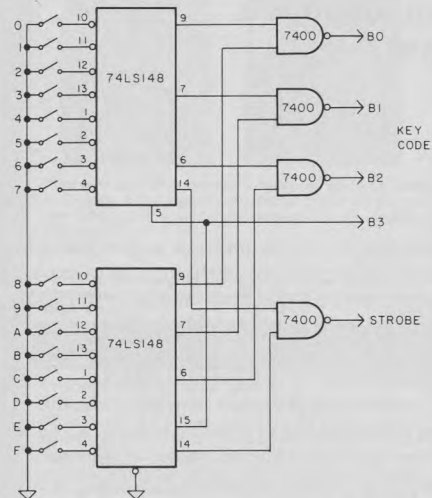


Fig. 9. Eight-switch electronic encoder. The 74LS148 will output a binary code for each line that is switched to ground.

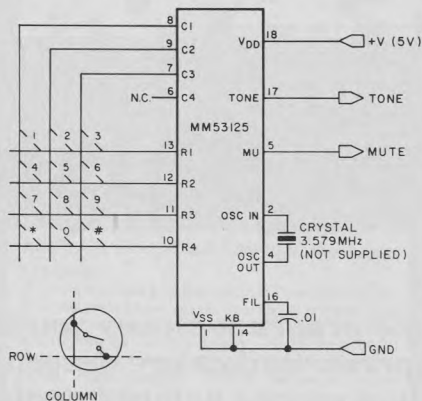


Fig. 10. Schematic of Radio Shack touch-tone pad.

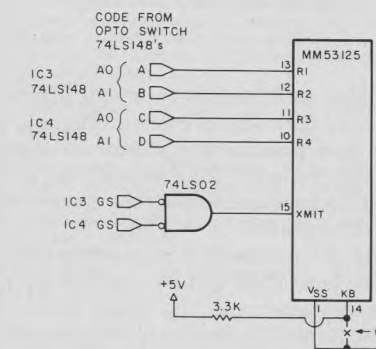


Fig. 11. Schematic showing changes to be made from original tone schematic (Fig. 10) to connect electronic input.

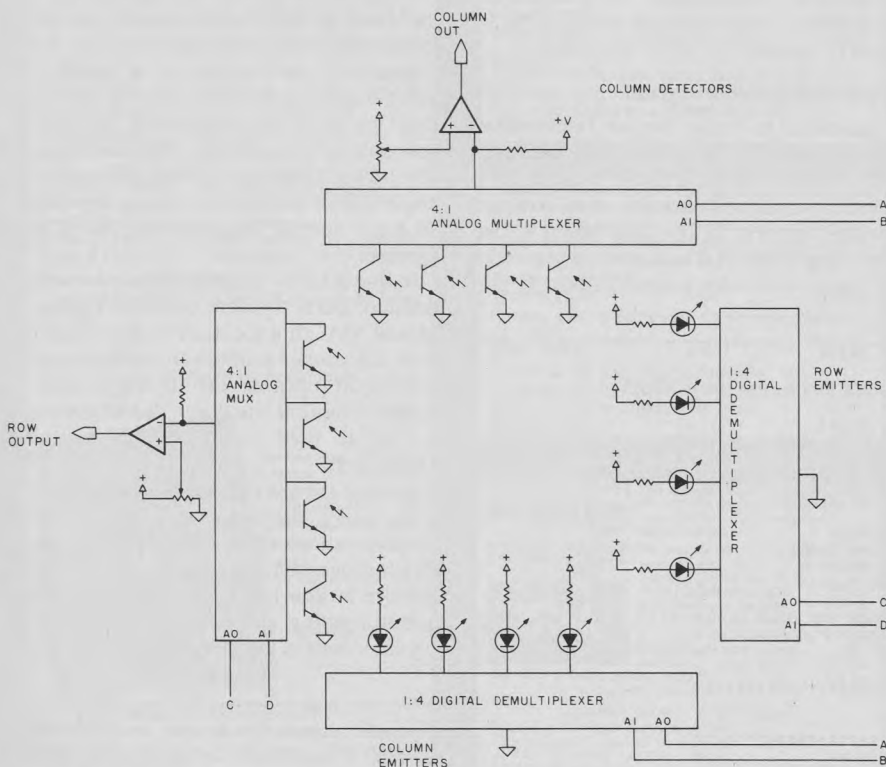
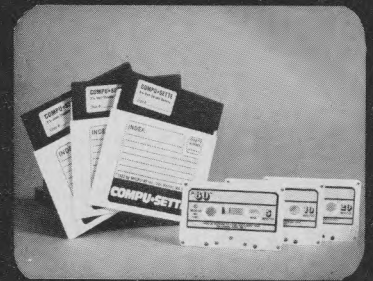


Fig. 12. Block diagram of 4x4 optical keypad utilizing scanner technique hooked to an external computer.

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## Survival or Shish Kebab?



***This VIC-20 game program places you in an evil doctor's chamber of horror. Spikes are descending upon you. Can you escape before impalement?***

By Thomas Henry

Doctor Dementia's House of Doom is an arcade-type game for the Commodore VIC-20 computer. It will run on a VIC with any size of memory and uses the joystick as a controller.

The game features three levels of play, making it suitable for all ages; extensive use of color, sound and graphics add to the thrills! Besides being fun to play, several important aspects of the VIC-20 are exploited in the game. Before looking at these details, let's see how the game plays.

Doctor Dementia has locked you in his torture chamber! All of a sudden you hear creaking noises. The malevolent Doctor has turned on an infernal device which causes spikes to descend from the ceiling. Your job is to destroy the spikes with a phaser gun before they get you. 1. There are three rules:

- Every spike that you destroy is gone for the rest of the game. You also get 1000 extra points.
- Your phaser gun is good for nine shots. If you run out of shots, you may recharge your gun by touching the ion packs on ei-

ther side of the screen with your player. You need both negative ions (from the left side) and positive ions (from the right side) to recharge. This means that you must zip back and forth while spikes are still descending!

● You get points for just staying alive. Unlike most games, the longer the clock runs the better.

The joystick is used to move back and forth, while the fire button fires the phaser gun. As mentioned above, there are three levels of play. First-degree torture is quite lenient, and you'll be able to win with large scores quite handily. Second degree is a little harder. Third degree is positively diabolical and may cause a severe increase in blood pressure!

### Examining the Program

In order to make Doctor Dementia's House of Doom run on VIC-20s with any size memory, several tricks must be employed. It is well known that strange things happen to the VIC when extra memory is added. The locations of screen memory and color memory change, de-

pending on the amount of extra RAM in place. For example, with up to 3K of extra RAM, screen memory starts at \$1E00 and color memory at \$9600. When more than 3K of memory is added, these locations change to \$1000 and \$9400.

Since this program depends heavily on peeks and pokes to the screen, some way of adjusting to these differences must be made; variables HB and CS in lines 580 and 590 serve this purpose. These two lines examine the video interface chip and determine where the start of screen and color RAM is. All other peek-and poke-type variables are derived from these two base numbers, so the whole program automatically adjusts to your particular configuration.

Applying the joystick is a programming challenge. (The VIC-20 may use the Atari or Sears joysticks with complete software and hardware compatibility.) The joystick uses two halves of two different VIA's (versatile interface adapters), so some special programming must be applied!

In line 590, the important variables are defined. DD is the data direction register of one VIA; this location will be loaded with the proper number to configure the VIA as an input device (to read the joystick). Note that the other VIA is already set up to read and needs no further adjustment.

Q1 and Q2 are the two locations of the VIAs which are read. The numbers in these locations indicate whether a right or left movement is called for, or whether the fire button has been depressed. The actual reading and interpretation of the joystick occurs in lines 400 through 420

Listing 1. Doctor Dementia's House of Doom for the VIC-20.

```

10 REM *****
11 REM *
12 REM * "DOCTOR DEMENTIA'S HOUSE OF DOOM" *
13 REM * (FOR ANY SIZE OF VIC-20) *
14 REM *
15 REM * THOMAS HENRY *
16 REM * TRANSONIC LABORATORIES *
17 REM * 249 NORTON STREET *
18 REM * MANKATO, MN 56001 *
19 REM *
20 REM * FEEL FREE TO MAKE AND GIVE *
21 REM * AWAY COPIES OF THIS PROGRAM, *
22 REM * BUT DO NOT SELL. *
23 REM *
24 REM *****
25 REM
26 REM
27 REM *****
28 REM *
29 REM * LISTING CONVENTIONS *
30 REM *

```

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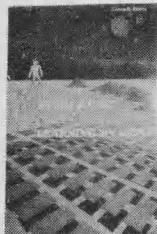
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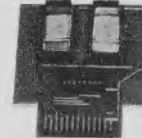
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Listing continued.

```

31 REM * CLEAR SCREEN [CLEAR] *
32 REM * HOME CURSOR [HOME] *
33 REM * CURSOR DOWN [DOWN] *
34 REM * CURSOR RIGHT [RIGHT] *
35 REM * REVERSE ON [RVS] *
36 REM * REVERSE OFF [OFF] *
37 REM * BLACK CURSOR [BLACK] *
38 REM * SPACE [SPACE] *
39 REM *
40 REM * WHENEVER YOU SEE THESE BRACKETED *
41 REM * SYMBOLS, TYPE THE CORRESPONDING *
42 REM * CURSOR CONTROL KEY. A NUMBER *
43 REM * WITHIN THE BRACKETS MEANS YOU *
44 REM * SHOULD TYPE THE KEY THAT NUMBER *
45 REM * OF TIMES IN A ROW. *
46 REM *
47 REM *****
48 REM
49 REM
100 POKE0,0:POKE1,0:GOTO460
110 C$="":E$=RIGHT$(STR$(J),1):FORI=1TOL:B$=MID$(A$,I,1)
120 IFB$=E$THEN140
130 C$=C$+B$
140 NEXT
150 A$=C$:L=LEN(A$)
160 IFL=0THENRETURN
170 X=L*RNDD(0)+1:J=VAL(MID$(A$,X,1)):S(J)=HP+2*J+C*Y(J)+2
180 Q=PEEK(S(J)):POKEND,NO+J
190 IFPEEK(S(J)+C)>32ANDY(J)+1<BTHENPOKES(J),F:GOTO680
200 IFQ=HTHENPOKES(J),F:POKEN,0:RETURN
210 IFQ=FTHENY(J)=Y(J)+1:IFY(J)-BTHENPOKES(J)+C,H:POKEN,0:RETURN
220 GOSUB110:POKEN,0:IFL=0THEN790
230 RETURN
240 IFP>LXTHENIFPEEK(P-2)-HANDPEEK(P-2)-FTHENPOKEP+1,32:P=P-1
250 GOTO270
260 IFP<RXTHENIFPEEK(P+2)-HANDPEEK(P+2)-FTHENPOKEP-1,32:P=P+1
270 IFP=LXTHENP=173
280 IFP=RXTHENP=171
290 IFP=173THENIFP=171THENP=185:P=160:P=160
300 POKEP-1,P:POKEP,P:POKEP+1,P:POKEP+1,P
310 U=254:P1=P1-1:POKEP,P1:R=P-C
320 POKER,RA:POKET1,U:U=U-1:R=R-C:IFPEEK(R)=HORPEEK(R)=FTHEN350
330 IFR<HP-2THENPOKEP+C,32:FORI=1TO3:FORJ=1TO10:POKET1,128+5*J:NEXTJ,I:POKET1,0:GOTO380
340 POKER+C,32:GOTO320
350 POKER,32:POKEP+C,32:J=INT((P-LX)/2):Y(J)=Y(J)-1:IFY(J)<>-1THEN380
360 GOSUB110:IFL=0THEN750
370 SC=SC+1000
380 POKET1,0:RETURN
390 FORDF=1TODI:POKEDD,127:PK=PEEK(Q2)AND128:JO=-(PK=0):POKEDD,255
400 PK=PEEK(Q1):J2=-(PKAND16=0):FB=-(PKAND32=0):G=JO+2*J2
410 ONGGOSUB260,240
420 IFFB=1ANDP1>176THENGOSUB310
430 CX=2+3*((-1)^IX)+1/2:IX=IX+1:POKEMI,CX:POKEPL,CX
440 PRINT"[HOME]"TAB(22-LEN(STR$(SC))):"[REV]";SC:SC=SC+10:NEXTDF
450 GOSUB170:GOTO390
460 POKE36879,90
470 PRINTCHR$(14):"[CLEAR][BLACK][DOWN] I, DOCTOR DEMENTIA ";
480 PRINT"[DOWN] OUT OF THE GOODNESS ";
490 PRINT"[DOWN] OF MY HEART, GIVE YOU ";
500 PRINT"[DOWN] A CHOICE OF TORTURE: ";
510 PRINT"[DOWN] FIRST DEGREE, SECOND ";
520 PRINT"[DOWN] DEGREE OR THIRD DEGREE";
530 PRINT"[B DOWN][REV]NOW CHOOSE! WHICH WILL";
540 PRINT" IT BE? (1, 2, OR 3) [OFF]";
550 GETAA$:IFAA$=" "THEN550
560 DI=VAL(AA$):IFDI<1ORDI>3THEN550
570 DI=4-DI:HB=4*(PEEK(36866)AND128)+64*(PEEK(36869)AND120)
580 CS=37888+4*(PEEK(36866)AND128):EB=HB+43:HP=EB+1:P=HP+451:LX=P-9:RX=LX+17
590 CE=CS+506:C=22:DD=37154:Q1=37151:Q2=37152:MI=CS+484:PL=CS+505:B=21
600 V=36878:N=36877:T1=36876:NO=244:P0=160:P1=185:P2=160:H=126:F=97:RA=30
610 L=9:POKE36879,142:PRINT"[CLEAR][C DOWN][C SPACES]";
620 FORI=0TOB:Y(I)=0:PRINTCHR$(161):NEXT
630 PRINT"[BLACK][SPACE][HOME]";POKEB164,173:POKEB185,171
640 FORI=HBTDEB:POKEI,P2:NEXT
650 POKEV,15:B$=256*PEEK(1)+PEEK(0):PRINT"[HOME][REV]#I: ";B$;"[HOME]";
660 PRINTTAB(11)"[REV]SCORE: ";
670 FORI=CSTOCE:POKEI,0:NEXT:GOSUB300:A$="012345678":GOTO390
680 GOSUBB70
690 PRINT"[REV][10 DOWN] YOU WERE IMPALED! ";
700 PRINT"[REV] BUT I SEE IT'S ONLY A";
710 PRINT"[REV] FLESH-WOUND. DO YOU ";
720 PRINT"[REV] HAVE THE COURAGE TO ";
730 PRINT"[REV] TRY AGAIN? [OFF]";
740 GOTOB30
750 GOSUBB70
760 PRINT"[REV][13 DOWN]SO YOU WON! DARE YOU ";
770 PRINT"[REV] TRY IT AGAIN? [OFF]";
780 GOTOB30
790 GOSUBB70
800 PRINT"[REV][12 DOWN]I'VE GOT YOU TRAPPED!";
810 PRINT"[REV] DO YOU HAVE ENOUGH ";
820 PRINT"[REV] NERVE TO PLAY AGAIN? [OFF]";
830 GETXX$:IFXX$="N"THENPOKE36879,27:PRINT"[CLR]";END
840 IFXX$<>"Y"THENB30
850 IFSC>BSTHENB$=SC-10:HI=INT(B$/256):LO=B$-256*HI:POKE0,LO:POKE1,HI
860 CLR:GOTO460
870 POKEN,0:POKET1,0:PRINT"[HOME][C DOWN]";
880 FORI=1TODI:PRINT"[RIGHT][20 SPACES][RIGHT]";NEXT
890 PRINT"[RIGHT][20 SPACES]";PRINT"[HOME][C DOWN]";FORJ=1TOD2
900 FORJ=1TOD2:PRINT"[C SPACES]";FORI=1TOD5
910 POKEN,245:PRINT"HA! ";FORK=1TOD15:POKEV,K:POKEN,NO+K-7:NEXTK,I,J:POKEN,0
920 POKEV,0:RETURN
READY.

```

Microcomputing welcomes conversions of this program for the Apple, Atari, Commodore, Heath and IBM microcomputers.

of the program (Listing 1). Notice that the data-direction register (represented by variable DD), is always returned to its original value after a read operation. This must be done since the keyboard also uses the VIA. Thus the keyboard and the joystick "timeshare" one VIA.

The high score is broken into a high byte and low byte (this allows you to save scores as large as 65535), and is poked into locations 0 and 1 at the end of each game. Thus, when you start to play a new round, you have the high score safely tucked away in memory. The high score is also displayed on the screen.

The main loop of the game is contained in lines 390 through 450. This loop sequentially checks for right or left movement, the fire button (indicating the phaser has been discharged) updates the score and moves a random spike a little bit lower. This main loop is the heart of the game; the rest of the program is nothing but subroutines.

The routine at lines 240 through 300 takes care of all right and left movement. But besides moving your character, it must check to see if any spikes are in the way or if you are touching a wall.

Lines 310 through 380 govern the phaser gun. In addition to creating the visual effect of a ray gun, exciting sounds are generated. If a spike has been completely immobilized by your marksmanship, the score (variable SC) is incremented by 1000.

Lines 110 through 230 generate the descending spike graphics. To increase the resolution of the display, half-size characters are used. The VIC-20 screen is 23 rows long, but by using half-size characters (in the proper order and combination), a size of 46 rows is generated. This greatly adds to the illusion of smooth, fluid movement.

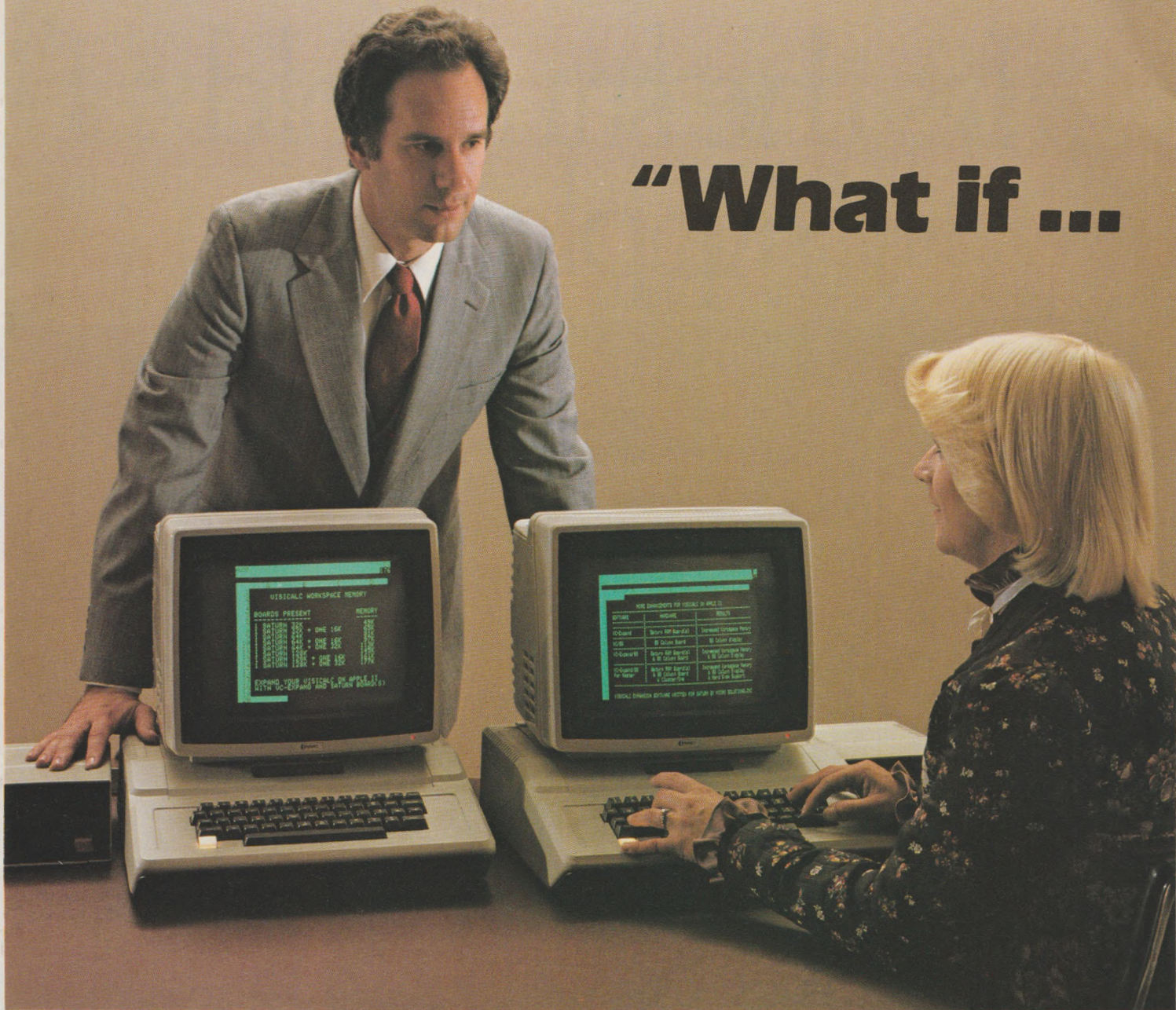
Lines 460 to the end cover all of the initial set-up and end-game necessities. The setup initializes all of the variables and asks for the level of play desired. The end-game portion tells how you have done and asks if you would like to play another game. Note: there are three possible endings: You may win by blasting back all of the spikes. You might be trapped between the spikes, unable to move. Finally, you may get impaled!

Keypunching the program should be easy; just follow the listing carefully. One of the strong points of the VIC-20 is its capability to use programmed cursor movements. This game uses many of them, and they are indicated in the program by some special-listing conventions. The key to these conventions is given in the REM statements in lines 27 through 47. By the way, don't type in the REM statements; they take up too much room.

After punching in the program, be sure to save it to tape or disk. Then pull the shades, darken the room and prepare to let Doctor Dementia scare you out of your wits! ★

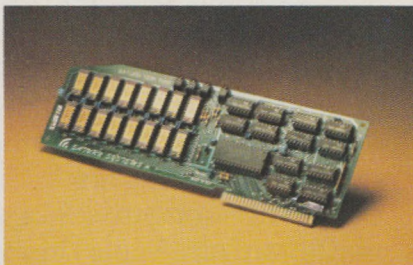


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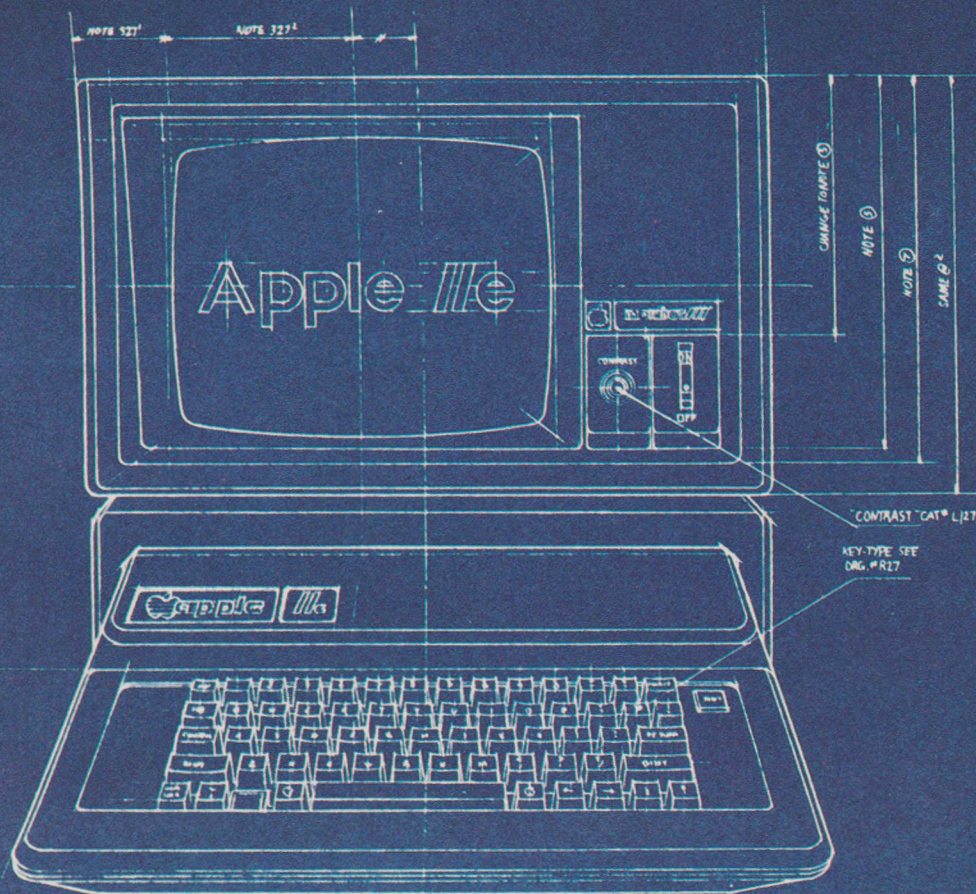
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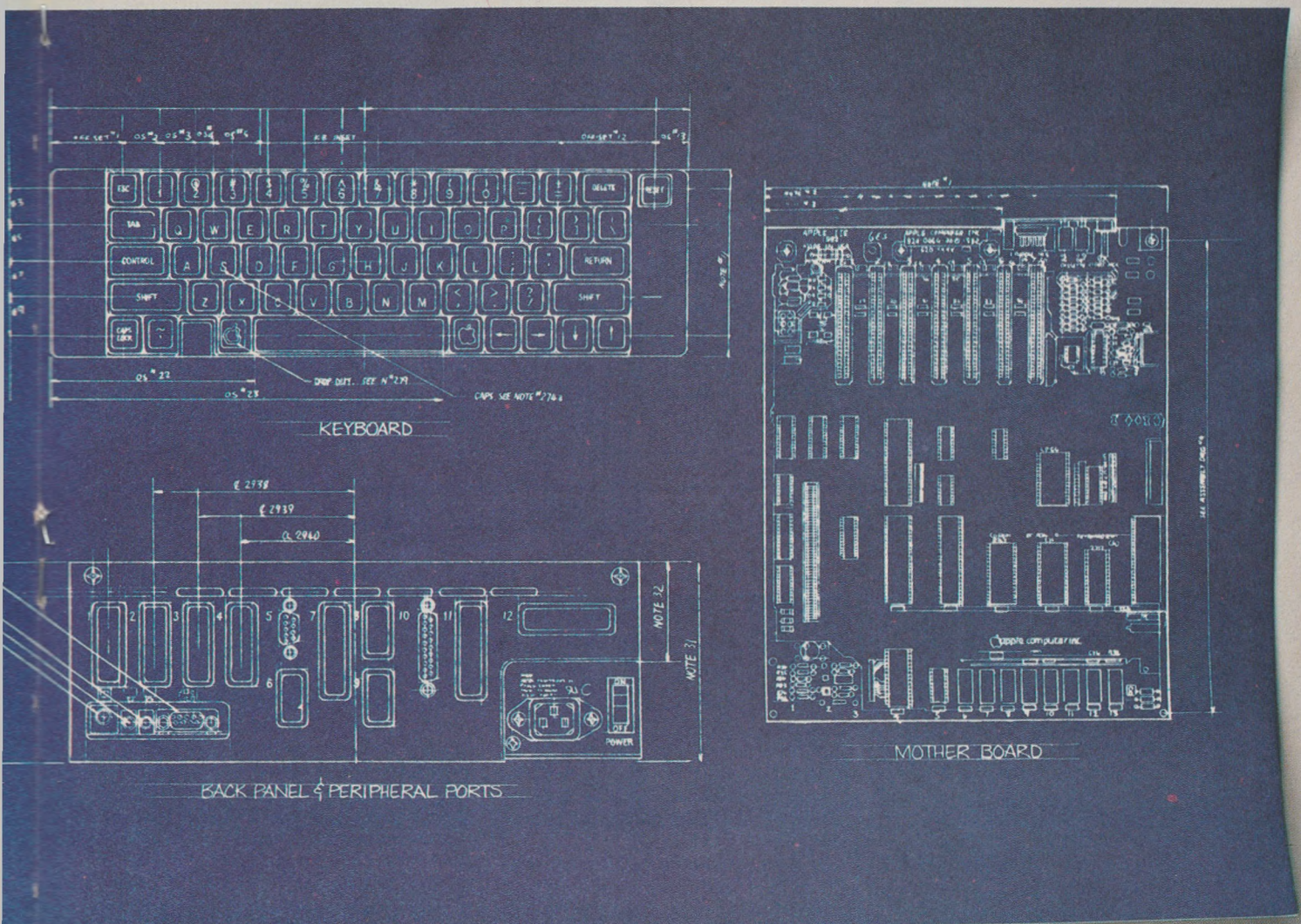
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# Conquering the Cube

By Leslie Schmeltz

*Don't let Rubik's Cube get the better of you. Fight back with The Programmable Cube for the Apple.*

Are you a serious Cuber? Not the ordinary, run-of-the-mill type who casually tries in vain to solve Rubik's Cube—but one who actually understands the fiendish logic of the popular puzzle.

The Programmable Cube offers a variety of facilities which allow you to simulate an actual cube, unscramble a cube with the built-in solver or make fancy patterns with particular sequences of moves. Using the cube language, you may assign a single name to a sequence of moves or actually try your hand at writing your own cube solver.

### Program Operation

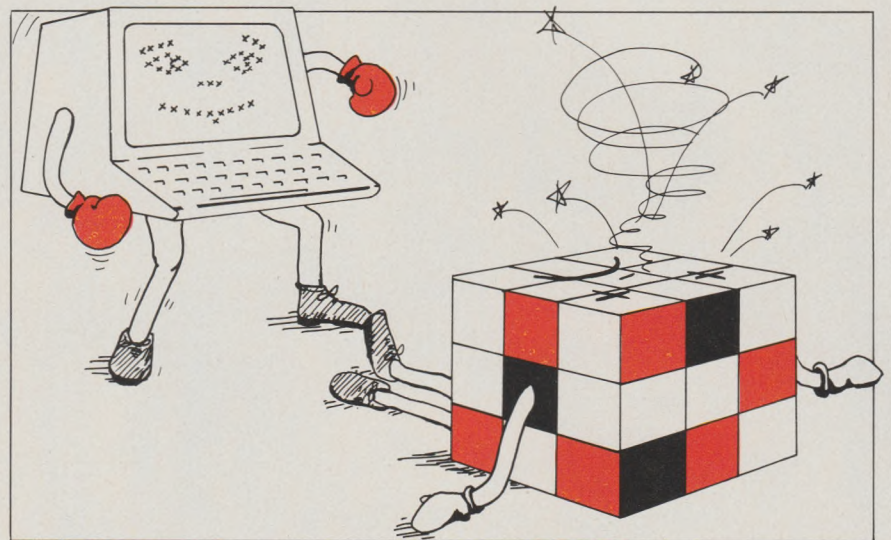
Booting the disk is simple, but the program does take a long time to load (actually it's about 30 seconds). After loading, a solved cube is shown on the display. A beep signals that the program is ready to accept your commands.

The method of display is interesting. Three sides of the cube are shown in perspective (front, right and upper) while each of the other three (back, left and down) are shown as if they were reflected in a small mirror held in proper position.

Each side is shown in color. To the right of the cube display is a prompt (>) and an underbar character which shows what instructions have been typed.

One of the most basic instructions you can type is DEMO. This routine gives a brief description of the program and an example of a scrambled cube being solved. It also shows a short program which makes a fancy pattern.

Actually, the scrambled cube can be pretty tough even for this routine—I sat and watched one go through 145 moves before solving the cube! The program used to solve the cube and produce the



demonstration patterns is displayed on the right side of the screen as it is being executed.

After you get past the demonstration, things get a bit more complicated. You will need to know some terminology associated with the cube and its component cubies.

The most basic moves are those involving the faces identified earlier. Each of the faces may be rotated one quarter turn clockwise (+), one quarter turn counterclockwise (-) or two turns in the clockwise direction (2). Each of these moves can be initiated by typing the letter representing the face, followed by the symbol designating the move desired. For instance, to move the front one quarter turn clockwise, type F+. Several commands, separated by spaces, may be combined on a line and will be executed sequentially.

If, by the way, you get yourself in trouble—there is an out. Typing RESET (not pressing the reset key) will put the cube back in its original state. This command is similar to the solution I have resorted to several times out of sheer frus-

tration and that my seven-year-old uses routinely, (i.e., taking the darn thing apart and putting the pieces (cubies) back together in the right pattern).

Three more rotation combinations provide for changing the surfaces displayed. You may specify front/back, right/left or up/down rotations clockwise, counterclockwise or two rotations.

Slice moves, which move one of the center slices of the cube, are provided in a horizontal (between the U and D faces), vertical (between the R and L faces) or middle (between the F and B faces) mode. Each of these can also be specified in a clockwise, counterclockwise or two turn instruction.

OK, got all this straight so far? Don't feel bad if it doesn't make a whole lot of sense. As is the case in many other situations, the concepts being described are much easier to see than read about. Once you have mastered the basic face, rotation and slice moves, the rest of the program begins to look much more logical.

Some sequence groups have been predefined within the program for your convenience. Scramble, followed by a num-



ber, will completely mess up the cube. The larger the number, the more difficult it will be to solve the scrambled cube. Backup restores the cube to where it was prior to executing the last move. Typing RESET (the letters, not the reset key) restores the cube to its original state. QUIT exits from the cube and "?" shows a list of the commands available.

Setup is a special command which allows you to tell the computer the configuration of a scrambled cube you may have available. Once SETUP is typed, you are asked to input the color of each cubie (according to a single character code) designated on the screen.

Once the cube has been entered, the program will check the validity of your information. If all is well, you may proceed to any of the other operations offered by The Programmable Cube.

During the execution of program operations, several mode capabilities may be toggled on or off. The guide mode causes the program to pause after each move until a key is pressed; Noguide toggles it off. The fast mode removes the simulated motion from the screen, Motion returns it. The quiet mode removes the statement stack to the right of the cube. Verbose returns it. As you expect, the color mode sets the display for a color TV

or monitor; BW sets up dot patterns for black and white.

There is a whole set of programming capabilities built into The Programmable Cube. In a brief review such as this, we will only be able to summarize them. Basic to the programming capabilities is Define, which allows the user to assign any statement or series of statements a single name. A single statement may be defined using the define-name statement. More complex statements are contained between begin and end limiters. The language also offers repeat and logical If statements.

Two programs are included on the disk—one to create patterns (called, logically, Patterns), and Solver, which is a relatively complete cube solver. Disk commands and operational capabilities are also included in The Programmable Cube.

### Impressions

This program offers two distinct levels of capability. For one who wants to watch the computer scramble and solve cubes. The Programmable Cube is no better or worse than several other programs on the market. The display method is not nearly as pretty as some of the other offerings and, in some ways, the animation is crude.

Where The Programmable Cube really comes into its own, however, is in programming capabilities. Within this program is a complete language which can be used to teach advanced programming concepts. What a wonderfully painless way to learn some of the more difficult concepts of programming!

You can construct programs that are complex or as simple as a single statement. The beauty of the system is being able to watch the cube execute your program while seeing the program displayed on the screen at the same time.

### Summary

The Programmable Cube offers a lot of capability for a reasonable price. In addition to being a relatively good entertainment program, it provides an enjoyable way to learn some of the more difficult aspects of computer programming. If you would like to extend your programming education via Rubik's Cube, I recommend it. The Programmable Cube is designed for a 48K Apple II or Apple II Plus and is supplied on a 16-sector (DOS 3.3) disk.

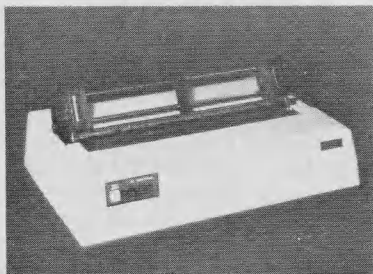
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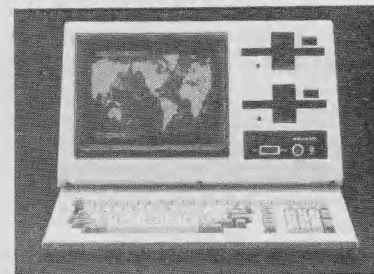


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# For Trickshot Artists And Escape Artists

## Pool 1.5 and Trickshot

Realistic and fun—  
The only thing  
Missing is the chalk

These two games are two of a kind. They allow several realistic pool games to be played in high-resolution graphics.

Pool 1.5 offers Eight Ball, Rotation, Straight Pool and Nine Ball. Up to four players can play.

The manual that comes with Pool 1.5 is effectively organized in 11 sections, including a glossary and a simple example. Particular care was used in the manual to carefully describe operation and ball control. A separate section was even used to describe physics as implemented in this game. The centerfold of the manual, easily referenced, is devoted to the complete command listings. (This makes it particularly easy to reference during the heat of a game.)

Aiming the cue ball on a digital display can result in problems, because there isn't enough resolution on the Apple screen. To a large extent, this problem was resolved by providing a coarse and a fine aim control. The letter A on the keyboard is used to toggle between the two modes. First the coarse aim is taken (this provides 64 lines of fire), the letter A is typed and the cue ball is given another 16 finer positions from the last coarse position.

Actual aiming is done with a game paddle or joystick. During the aiming sequence a phantom ball is projected in the direction of aim, connected to the cue ball with a dotted line. As the joystick is positioned, the phantom ball and connecting line move around the table. The phantom ball is projected as far as possible until it touches another ball or rail.

The cue ball can be programmed for

both speed and English. It is shot by pressing a paddle button.

A number of other features can be programmed. Balls can be colored or numbered. Table friction (this determines ball deceleration) can be adjusted from practically no friction to a very mushy game. The speed of action can be changed from very fast to slow motion. (This has no effect on the game, just the rate at which it is displayed.)

Two other features that are very handy are Replay, which allows you to automatically reset the table and reshoot the last shot, and Terminate, which stops any action in progress. It is even possible to replay the last shot in slow motion so the ball action can be studied. All commands are entered as single key strokes except those that need a number to set a parameter.

Trickshot is an extension of Pool 1.5. This game provides Billiards, Three Ball, Snooker and Open Table. Operation of these games is very similar to Pool 1.5, except aiming resolution is improved (128 positions for coarse, 32 for fine). A fifth game, Trickshot, allows you to easily set up a shot, one ball at a time, then use replay to practice until the shot is perfected. At this point it can be saved on a shots disk where it can be recalled to amaze Willie Mosconi, Minnesota Fats and your other friends.

The manual packaged with Trickshot is as complete and detailed as that of Pool 1.5, but I would have liked more information or perhaps an example detailing how to set up a trickshot.

So much for the descriptions of these games. How do they play? Very well, thank you. Ball interactions are smooth and realistic. I particularly enjoyed being able to second-guess myself and replay a shot I'd missed. I like bashing balls around and found the games enjoyable. The Trickshot games are a little better

because of the finer resolution available. It is possible, in both Trickshot and Pool 1.5, to shoot a ball into a pocket in such a manner that it bounces out again, a good example of the detail that went into the development of these games. English can be applied to the cue ball and the results are clearly seen on a replay of the same shot. (No provision was made to allow the amount of English to be changed.)

If you like pool, I am sure you will find both of these games interesting. The physics of the game seem to have been faithfully reproduced within the resolution limits of the Apple. The ball action is lively and the Apple clicks the loudspeaker whenever a ball strikes another.

As with other IDSI products I've reviewed, these games have an automatic copy routine built into them, as well as the standard if-the-disk-is-defective warranty. Overall, a very good job on a complex game, a good manual and good effective graphics. I'd rate these two games state of the art in personal computing. (*Innovative Design Software, Inc., PO Box 1658, Las Cruces, NM 88004. \$34.95 each.*)

**Jim Hansen**  
New Boston, NH

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This game from Automated Simulations, for the Atari 400/800 (40K), is definitely not one of the "Shoot 'Em Up" type games which have become so popular in recent years. Rather, it's a form of story-book play, using the same general type of role-playing found in *Dungeons and Dragons*.

In this version you choose from a list of items designed to enhance your ability to survive. It's something like selecting character traits in a dungeon-like scenario.

Another role-playing feature involves combat. When you're confronted by beasts, the computer decides the outcome of each attack. This is similar to how dungeon referees resolve conflict situations.

As far as comparisons to general games are concerned, the acquisition of power in the form of gold pieces found around the island is vaguely similar to Gebelli's *Pathfinder* game, in which the hero collects nuclear waste in order to get stronger.

Here's how it goes: you read the introductory literature in the instructions booklet (the melodrama presented is superfluous, but finely evocative of role-playing backgrounds). You're stranded upon a black island on the screen. As you roam and explore over scrolling graphics, you must face hunger and evil. You collect treasure to gain power.

Your ultimate goal is to find Alcemnon's diary, to garner its secrets and aid your escape plans. But watch out—monsters like Harrises, Satyrs and Giant Med Flies lurk everywhere. Most are easy to evade, but they do pose a threat in tight situations. If one strikes, you press either F (flee) or A (attack) on the keyboard. If you flee, you must go back to the beginning and start over (still retaining your powers, gold and possessions). If you slug it out, the relative strengths of both fighters are weighed by the computer—if you lose, you're stripped of everything and sent back to Square One. (Thus, it's best to lay low in the beginning, when you're weaker.) The adventure takes from 30 minutes to several hours to resolve, but unfinished games can be stored for future use.

Throughout the journey your computer warns you of nearby nasties and lends supportive advice. When the diary is discovered, R is pressed and the book's contents are revealed.

The graphics appear rather drab, lacking in variety and brightness, and the clarity of the tiny shapes (stationary and moving) could stand improvement. The directions in regard to how to enter new sections of the game also leave something to be desired.

Finally, it can be frustrating to start over and over again each time you are de-

feated. To alleviate the nerve-strain, draw a map of each section to quicken the action.

If you relish adventure games and are willing to spend the necessary hours for full enjoyment, you should have fun with *Escape from Vulcan's Isle*. (EPYX/Automated Simulations, 1043 Kiel Court, Sunnyvale, CA 94086, \$29.95)

**John DiPrete  
Cranston, RI**

## Castle Wolfenstein

### A captivating and Challenging game with A German twist

Sprechen Sie Deutsch?

Do you like escape-type games? Have you ever played one that speaks German to you?

If your answers are yes and no, in that order, try *Castle Wolfenstein*.

This is the scene—you are a prisoner in *Castle Wolfenstein*. You are about to be interrogated and tortured by the Nazi SS. A dying cellmate in the dungeons of the castle bequeaths you your only hope—a gun and ten bullets.

The object of the game is to find the war plans for Operation Rheingold and escape from the castle. Let me assure you, escaping alive is much easier said than done!

### Operation

Once the program disk has been boot-ed, several options are available. Pressing the return key when the title page appears will display a selection menu. From that menu you may choose the mode of control (keyboard, paddles or joystick), generate a new castle, retain or reset your present rank, or exit to the selection page without generating a new castle.

Control is needed for your character to move through the castle and for initiating several functions during play. Using the keyboard, for instance, gives you eight direction keys and one stop movement key as well as a fire-gun key. Several other keys are defined: T, to throw a grenade in direction of aim; RTN, to list personal supplies; U, to use contents of open chest; the space bar, to search guards and unlock doors or chests; and the escape key, to terminate play and save your position.

Joystick control is provided by using button 0 to select movement or aiming, and button 1 for firing the gun. Control by paddles is a bit awkward and takes some practice.

Your escape begins in the lowest level of the castle. You are equipped with a gun

and ten bullets. The object is to find the chest containing the war plans, obtain the plans and escape from the castle.

Each room has at least one exit that leads to an adjoining room or a stairway that leads to another level of the castle. Some of the rooms have several exit options. During play, you may backtrack through rooms already covered.

In your travels, you will encounter guards and SS stormtroopers. These characters move around and patrol the area assigned to them. Sometimes they get downright aggressive. This requires some fast action on your part to keep you from becoming "Kaputt." Using the aiming controls, you can shoot or cause a guard to surrender. If you search any of these guards and they have some items you need, they are automatically transferred to your supply. You can accumulate a maximum of ten bullets, three grenades, a bulletproof vest, a uniform and the war plans for Operation Rheingold.

Most of the rooms also contain a chest which may or may not hold items you need for your escape. Aiming your gun at the chest and pressing the space bar shows you the amount of time required to open the chest. The time may be shortened by shooting at the chest and pressing the space bar again. All this may be for naught if the chest contains some useless item like schnapps!

If you like a challenge, the Allied High Command will consider promoting you if you successfully escape from the castle. With a promotion, of course, comes an increased degree of difficulty in escaping from the next castle. Eight degrees of difficulty are offered.

### Impressions

This program is captivating, in both a literal and figurative sense. It presents an interesting and entertaining challenge. The graphics and animation are well done.

One of the most interesting aspects of this program is the fact that the guards talk (and curse) in German. Although their vocabulary is quite limited (eight words, as a matter of fact), the effect certainly adds to the overall entertainment value of *Castle Wolfenstein*.

Is it challenging? You bet your schnitzel it is! For the first few times through the program, I thought "Kaputt" was the name of my little character!

If the prospect of an escape game with some interesting twists appeals to you, *Castle Wolfenstein* may be worth considering for your library.

*Castle Wolfenstein* requires an Apple II or Apple II Plus, 48K, Applesoft ROM and Disk II. (Muse Software, 347 N. Charles St., Baltimore, MD 21201. \$29.95)

**Leslie Schmeltz  
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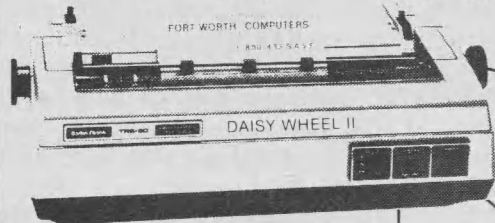
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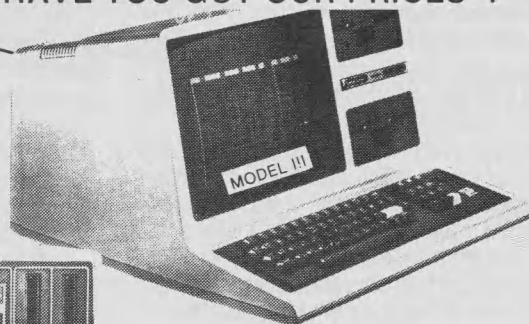
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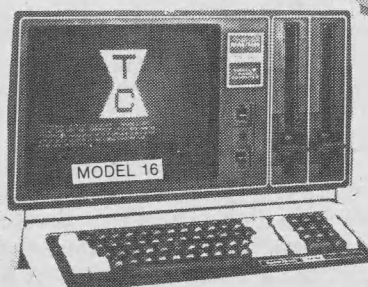
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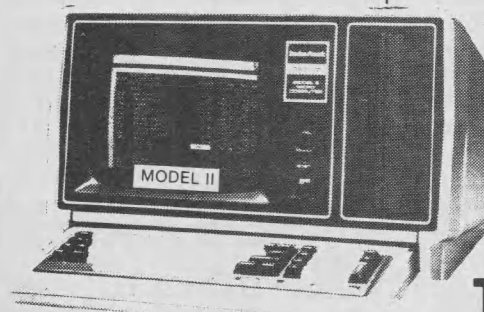


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# How Video Displays Work

*The author concludes his tutorial on how "a computer-programmed video presentation in memory appears on a video monitor."*

By James M. Callaghan

The theory of operation of the Z80A/MC6845 video display through the video memory control unit has been explained in the first part of this article.

In this final part I will finish the theory of operation and explain how to program the CRTC. In addition, I will present the schematic of the Z80A/MC6845 video display, provide IC pinout labels and conclude by showing some TV display photographs.

The MC6845 has four signal input lines ( $\overline{CS}$ , RS, R/ $\overline{W}$  and E) for processor interface control. Their conditions must be satisfied if the CPU is to program or read from the CRTC internal data registers. The chip select ( $\overline{CS}$ ) line, when low, allows the CPU to write to or read from the CRTC internal data registers.

The register select (RS) line serves

two purposes. First, when the RS line is driven low, it indicates to the CRTC that CPU output data is to load the address register with the address of the data register that the CPU will next program or read from. Second, when RS is high, it indicates to the CRTC that the CPU data is to program or read from the data register whose address was loaded in the address register when RS was low.

The read or write (R/ $\overline{W}$ ) line determines whether the CRTC internal register file is to be programmed (active low) or read from (active high).

The enable (E) control signal enables the CRTC data bus input and output buffers to clock data to and from the CRTC. The E signal is active on its high to low voltage transition. The MC6845 bus timing characteristics specify that the  $\overline{CS}$  and RS control signals must have a minimum of 160

nanoseconds (ns) set-up time prior to the E signal positive transition. The Z-80A's control signal outputs cannot directly satisfy this CRTC requirement, so interface circuitry must be designed.

One method takes advantage of the delay between the address data on the address lines and the memory request signal ( $\overline{MREQ}$ ) going low. Another method uses a Z-80A gated clock signal delay combined with the  $\overline{MREQ}$  signal. My video display is totally programmed and read by the Z-80A through only two I/O channels, leaving the CPU memory signals free for memory addressing only. In this article, I'll define I/O channel 2 as the CRTC register select load channel and I/O channel 3 as the CRTC internal data register read/write channel. Fig. 1 shows the CRTC control logic I used.

The  $\overline{CS}$  control signal is generated by an AND gate output going low if either of its two input signals ( $\overline{IO2}$  or  $\overline{IO3}$ ) goes low due to CPU I/O action on either channel 2 or channel 3. This satisfies the CRTC chip select active low requirement.

The E control signal is generated by triggering one half of a (74LS123) dual retriggerable one-shot with the  $\overline{CS}$  signal described above. The output is a pulse that goes positive 200 ns after the one-shot is triggered by the E input signal going low. The one-shot delayed output positive pulse is combined with the inverted  $\overline{CS}$  signal by

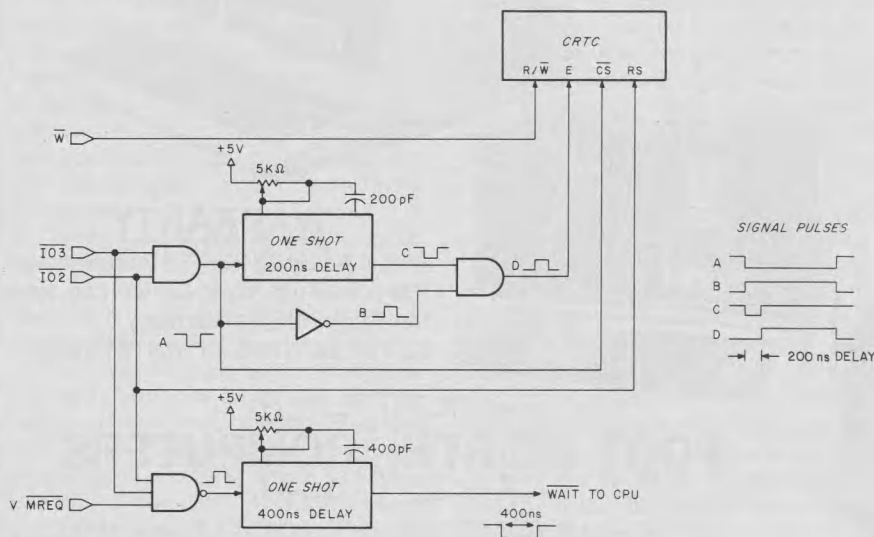


Fig. 1. CRTC control logic showing how the  $\overline{W}$ ,  $\overline{IO2}$  and  $\overline{IO3}$  signals are combined to generate the required R/ $\overline{W}$ , E,  $\overline{CS}$  and RS CRTC control signals. The signal pulse diagram on the right shows how the E signal is generated by the one-shot delay gate. The CPU WAIT generation circuit is also shown.

(Part 1 of this article appeared on p. 104 of the January 1983 Microcomputing.)

Address correspondence to James M. Callaghan, 5728 Albright Drive, Virginia Beach, VA 23464.



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the serial interface parameters to be used.

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an AND gate. The AND gate output is a positive signal that begins 200 ns after the  $\overline{CS}$  goes low and ends when the  $\overline{CS}$  signal goes high. This meets the CRTC minimum of 160 ns  $\overline{CS}$  set-

up time prior to the E signal positive transition requirement.

The other half of the dual one-shot (74LS123) is used to generate a Z-80A  $\overline{WAIT}$  signal when the CPU is either

accessing the video memory or the CRTC through I/O action (I/O2 or I/O3). The  $\overline{WAIT}$  signal delay is necessary since my Z-80A operates at a 4 MHz clock rate (250 ns clock cycle

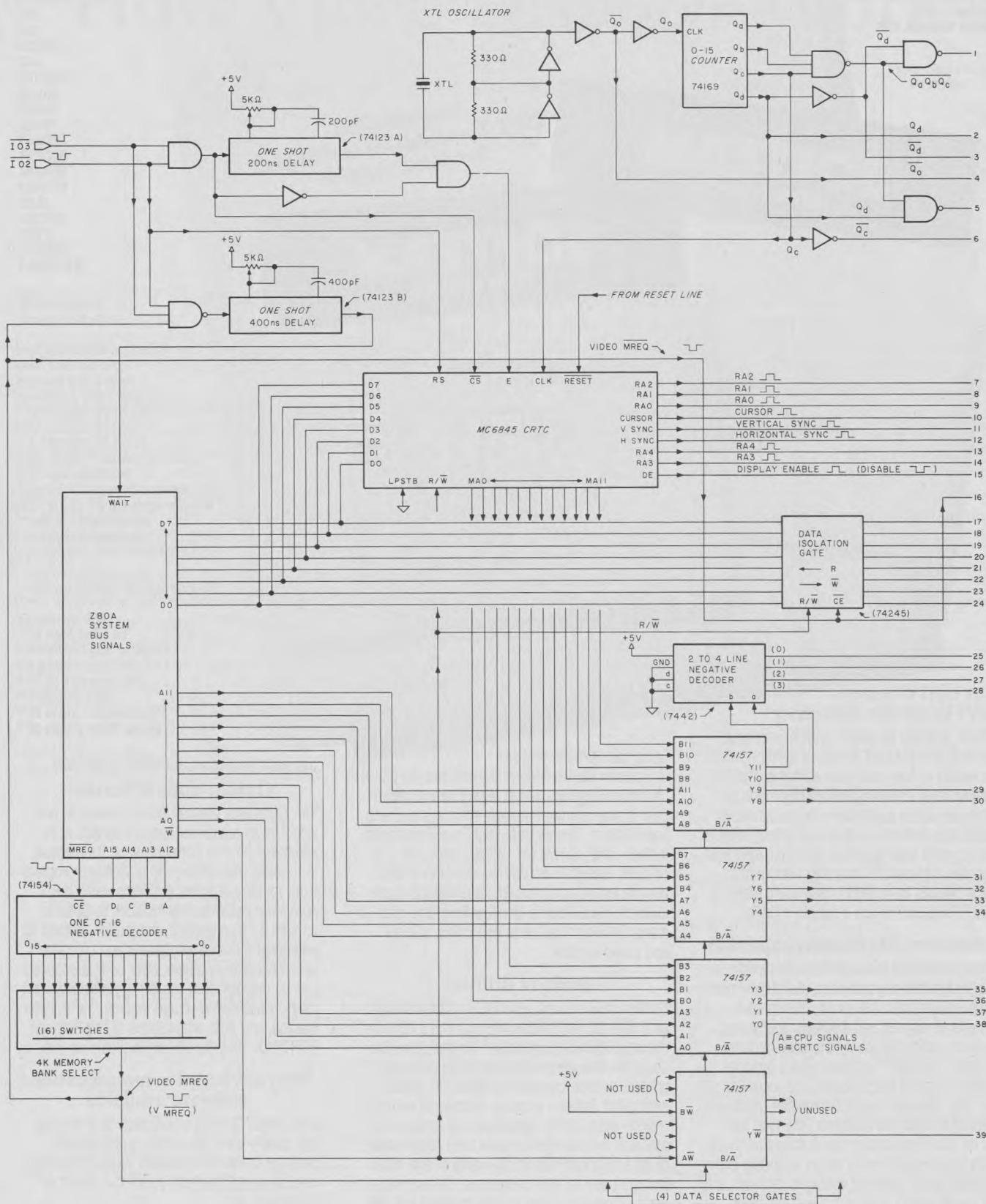


Fig. 2. Z-80A/MC6845 video display schematic. Notice that the "Z-80A System Bus Signals" block represents the Z-80A address, data and control lines used, not the Z-80A CPU.

time), which is too fast for the CRTC or my video memory. The MC6845 bus timing characteristics specify that the minimum enable cycle time be 1  $\mu$ s. My video memory consists of

eight 2114 integrated circuits (ICs) with a maximum memory access time of 400 ns. The 400 ns maximum access time is fast enough for normal video memory display. The Z-80A

automatically inserts one wait state in I/O applications, but not in memory read or write cycles.

The variable resistors I used in the video circuit delay and for the video

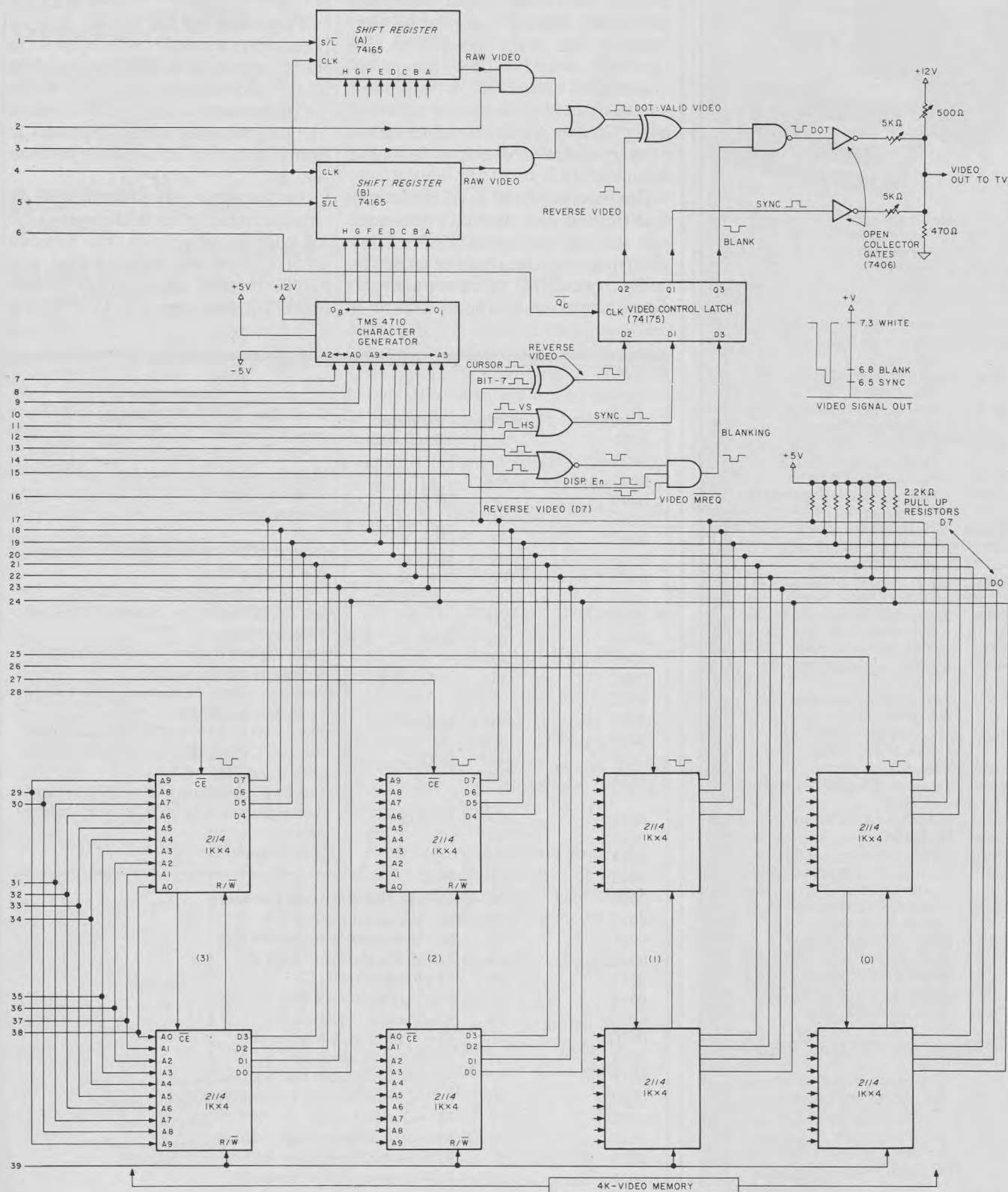


Fig. 3. Pinout labels of the main integrated circuits I used in the Z-80A/MC6845 video display circuit showing pin numbers, name, purpose (Input or Output) and source or destination of the pin external signal or voltage.



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output level shifting can be replaced with nonvariable resistors once you determine the desired values. I chose to keep the resistors variable for flexibility.

The character generator I chose was a Texas Instruments TMS 4710, because it has an 8×8 dot character matrix with full upper/lowercase ASCII and limited graphics applications. It has some drawbacks, including -5 and +12 V power requirements and a 450 ns minimum access time; also the use of an external pull-up resistor is required on each input line. The chip is no longer manufactured.

The combined 450 ns minimum access time for the character generator and the 400 ns access time for my video memory can result in an 850 ns delay from CRTC video memory address output to character generator

stable output data available for S/R loading. Because of the possible long delay, I recommend the use of faster access video memory and character generator ICs, if it is desirable to use a dot frequency oscillator that is to operate at over 15 MHz.

### Programming the CRTC

Programming the CRTC internal registers is a simple two-step process. First, output on channel 2 the address of the internal data register to be read or programmed, and second, output the programmed data or input the internal data read information on channel 3.

For example, to program the desired number of vertical display rows of 20H (hexadecimal), the number, 20H, must be programmed into CRTC internal data register number 06H. The first step is to load the ver-

Address	Data	Mnemonic	Comments
0000	21	LD HL, 0025	•Load HL register with the highest data table address—0025H
0001	25	"	"
0002	00	"	•Load B register with the total number of table data fields F
0003	06	LD B, 0F	•Test for B=0
0004	0F	"	"
0005	78	LD A, B	•Jump to 0015 if B negative to halt program due to completion.
0006	A7	AND A	"
0007	FA	JP N, 0015	•Set up to output on channel 2 to load address register.
0008	15	"	•Place register number in address register. B contains register number.
0009	00	"	•Set up to output on channel 3 for loading external register data.
000A	0E	LD C, 02	•Place data into CRTC internal data register. Output (HL) on channel 3 then DEC B and (HL).
000B	02	"	•Continue loading data into CRTC internal data register. Go to 0005 for next register data.
000C	ED	OUT (C), B	•Halt program.
000D	41	"	
000E	0E	LD C, 03	
000F	03	"	
0010	ED	OUT D	
0011	AB	"	
0012	C3	JP 0005	
0013	05	"	
0014	00	"	
0015	76	HLT	
0016	4E	R0—Horizontal Total (78 Decimal)	
0017	35	R1—Horizontal Display (53)	
0018	3E	R2—Horizontal Sync position (62)	
0019	06	R3—Horizontal Sync width (6)	
001A	20	R4—Vertical Total (32)	
001B	00	R5—Vertical Total Adjust (0)	
001C	1B	R6—Vertical Displayed (27)	
001D	1D	R7—Vertical Sync position (29)	
001E	00	R8—Interlace Mode (0)	
001F	07	R9—Maximum Scan Line address (7)	
0020	40	R10—Cursor Start (0), 1/16 field rate Blink	
0021	07	R11—Cursor End (7)	
0022	00	R12—Start Address (High Address) (0)	
0023	00	R13—Start Address (Low Address) (0)	
0024	00	R14—Cursor (High Address) (0)	
0025	00	R15—Cursor (Low Address) (0)	

Program listing. Load CRTC Registers (0000–0015) and CRTC Register data table (0016–0025).

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tical display register address (06H) into the address register on channel 2 by the Z-80A Zilog mnemonic OUT 2, 06. The second step is to output the desired number of vertical displayed rows (20H) to the register whose address (06H) was loaded into the address register on channel 3 by the mnemonic OUT 3, 20. These two I/O programming actions complete loading the 20H data into internal data register (vertical display) number 06H. Of the 19 CRTC internal data registers, only the two cursor (high and low address) and two light pen (high and low address) registers can be read. To read a register, the mnemonic IN 3 would be used after the register address had been loaded into the CRTC address register.

The following example program calculations are for the programming of a 27-row TV screen centered-display of 53 characters per row. The dot oscillator frequency is 10 MHz. The letter H following a number means the number is hexadecimal (0-9, A-F) equivalent of a 0-15 decimal count.

**Horizontal total register (R0)**—Total of displayed plus nondisplayed character time units minimum one. Calculations:

(a) Oscillator dot frequency = 10 MHz

(b) CRTC character frequency =  $a/8 = 1.25 \text{ MHz}$

(c) TV horizontal frequency = 15,750 Hz

(d)  $R0 = (b/c) - 1 = 4EH$

**Horizontal display register (R1)**—Number of display characters per horizontal line. There are to be 53 characters per horizontal display row. Calculations:

(a)  $R1 = 53 = 35H$

**Horizontal sync width register (R3)**—Width of the horizontal sync pulse in number of characters. Calculations:

(a) TV horizontal sync width = 5 $\mu$ s

(b) CRTC character frequency = 1.25 MHz

(c)  $R3 = a \times b = 6H$

**Horizontal sync position register (R2)**—Horizontal sync position, in character units, on the horizontal line. Calculations:

(a)  $R2 = (R0 + R1 - R3)/2 = (78 + 53 - 6)/2 = 3EH$

**Vertical total register (R4)**—Total number of displayed plus non-displayed character rows minus one. Each of my character rows contains eight TV scan lines. Calculations:

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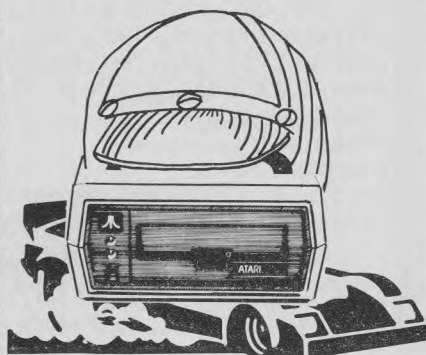


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- (a) TV vertical field frequency = 60Hz  
(b) TV field scan time =  $1/a = 16.66 \text{ ms}$   
(c) Scan lines per character = 8 lines  
(d) Total horizontal character (R0) = 79.4 characters  
(e) CRTC character frequency = 1.25 MHz  
(f) CRTC character time =  $1/e = 0.8 \mu\text{s}$   
(g) TV scan line time =  $d \times f = 63.5 \mu\text{s}$   
(h) TV character line time =  $c \times g = 508 \mu\text{s}$   
(i)  $R4 = b/h - 1 = 32 = 20H$

*Vertical total adjust (R5)*—Fraction of character rows, expressed in lines, remaining from R4 character row calculations. Calculations:

- (a) This calculation uses 256 TV nonsync scan lines per field, includ-

ing the 242 usable (visible) scan lines per field.

- (b) Scan lines per character = 8 lines

(c)  $R5 = a - (R4 \times b) = 256 - (32 \times 8) = 0H$

*Vertical displayed register (R6)*—The number of character rows on the TV screen. There are to be 27 displayed character rows. Calculations:

(a)  $R6 = 27 = 1BH$

*Vertical sync position (R7)*—Vertical sync pulse position. The vertical sync pulse width is fixed in the CRTC at a 16 raster line time period. Calculations:

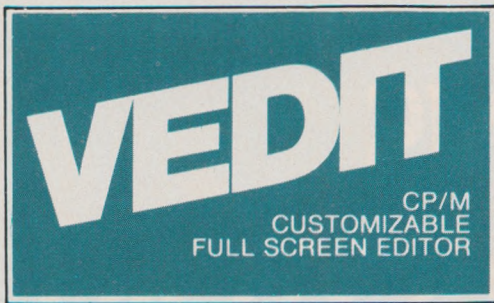
(a)  $R7 = (R4 + R6)/2 = (32 + 27)/2 = 29 = 1DH$

*Interlace mode register (R8)*—Sets the raster scan mode. Interlace sync and video (mode 3) effectively doubles the character rows. In this case the 27 normal display rows will double to 54 display rows. Normal

PIN	NAME	I/O	SOURCE OR DESTINATION
1	VSS	I	POWER SUPPLY (GND)
2	RESET	I	CPU RESET BUS LINE
3	LPSTB	I	LIGHT PEN (GND)
4	MA0	O	DATA SELECTOR (B0)
5	MA1	O	" " (B1)
6	MA2	O	" " (B2)
7	MA3	O	" " (B3)
8	MA4	O	" " (B4)
9	MA5	O	" " (B5)
10	MA6	O	" " (B6)
11	MA7	O	" " (B7)
12	MA8	O	" " (B8)
13	MA9	O	" " (B9)
14	MA10	O	" " (B10)
15	MA11	O	" " (B11)
16	MA12	O	FUTURE USE (NC)
17	MA13	O	" " (NC)
18	DISP EW	O	BLANKING SIGNAL COMBINER
19	CURSOR	O	REVERSE VIDEO COMBINER
20	VCC	I	POWER SUPPLY (+5v)
21	CLK	I	COUNTER (Q <sub>c</sub> )
22	R/W	I	CPU W BUS LINE
23	E	I	200 ns ONE SHOT AND GATE
24	RS	I	IO <sub>2</sub> DECODER LINE
25	CS	I	IO <sub>2</sub> , IO <sub>3</sub> AND GATE
26	D7	I/O	CPU DATA BUS (D7)
27	D6	I/O	" " " (D6)
28	D5	I/O	" " " (D5)
29	D4	I/O	" " " (D4)
30	D3	I/O	" " " (D3)
31	D2	I/O	" " " (D2)
32	D1	I/O	" " " (D1)
33	D0	I/O	" " " (D0)
34	RA4	O	BETWEEN-CHAR-LINE BLANK GATE
35	RA3	O	" " " " "
36	RA2	O	CHARACTER GENERATOR (A2)
37	RA1	O	" " " (A1)
38	RA0	O	" " " (A0)
39	HSYNC	O	SYNC COMBINER OR GATE
40	VSYNC	O	" " " " "

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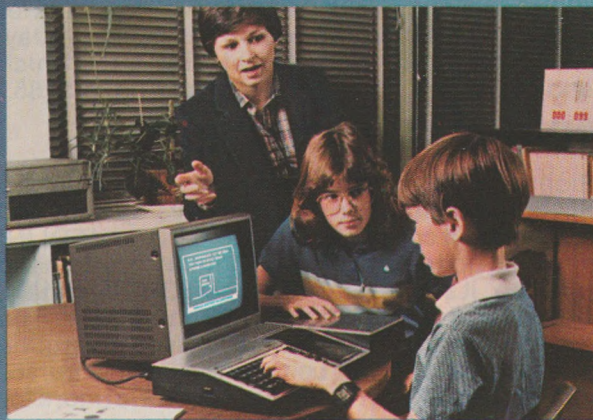
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PIN	NAME	I/O	SOURCE OR DESTINATION
1	A7	I	VIDEO MEMORY (D4)
2	A6	I	" " (D3)
3	A5	I	" " (D2)
4	A4	I	" " (D1)
5	A3	I	" " (D0)
6	A2	I	CRTC (RA2)
7	A1	I	CRTC (RA1)
8	A0	I	CRTC (RA0)
9	O1	O	SHIFT REGS A&B (A)
10	O2	O	" " " (B)
11	O3	O	" " " (C)
12	VSS	I	POWER SUPPLY (GND)
13	O4	O	SHIFT REGs A&B (D)
14	O5	O	" " " (E)
15	O6	O	" " " (F)
16	O7	O	" " " (G)
17	O8	O	" " " (H)
18	$\overline{OE2}$	I	(GND)
19	VDD	I	POWER SUPPLY (+12V)
20	$\overline{OE1}$	I	(GND)
21	VBB	I	POWER SUPPLY (-5V)
22	A9	I	VIDEO MEMORY (D6)
23	A8	I	VIDEO MEMORY (D5)
24	VCC	I	POWER SUPPLY (+5V)

TMS4710 Character Generator.

PIN	NAME	I/O	SOURCE OR DESTINATION
1	U/ $\overline{D}$	I	(+5)
2	CLK	I	OSCILLATOR ( $Q_0$ )
3	A	I	(NC)
4	B	I	(NC)
5	C	I	(NC)
6	D	I	(NC)
7	EN $\overline{P}$	I	(GND)
8	END	I	POWER SUPPLY (GND)
9	LOAD	I	(+5)
10	EN $\overline{T}$	I	(GND)
11	$Q_d$	O	TIMING LOGIC GATES
12	$Q_c$	O	" " "
13	$Q_b$	O	" " "
14	$Q_a$	O	" " "
15	C OUT	I	(NC)
16	VCC	I	POWER SUPPLY (+5)

Timing Counter (74169).

PIN	NAME	I/O	SOURCE OR DESTINATION
1	S/ $\overline{L}$	I	TIMING 2-INPUT NAND GATE
2	CLK	I	OSCILLATOR ( $\overline{Q}_0$ )
3	E	I	CHARACTER GENERATOR (05)
4	F	I	" " " (06)
5	G	I	" " " (07)
6	H	I	" " " (08)
7	$\overline{Q}_H$	O	(NC)
8	GND	I	POWER SUPPLY (GND)
9	$Q_H$	O	AND-OR VIDEO GATES
10	SER IN	I	(GND)
11	A	I	CHARACTER GENERATOR (01)
12	B	I	" " " (02)
13	C	I	" " " (03)
14	D	I	" " " (04)
15	CLK INH	I	(GND)
16	VCC	I	POWER SUPPLY (+5)

Shift Register A & B (74165).

sync will be selected. Calculations:

(a) Mode 0: Normal sync (non-interlace)

Mode 1: Interlace sync

Mode 3: Interlace sync and video

(b) R8 = 0H

Maximum scan line address register (R9)—Number of scan lines per character row, including spacing, minus one. Calculations:

(a) Scan lines per character = 8 lines

(b) R9 = a - 1 = 7H

Cursor start register (R10)—Bits 0-4 set the cursor start scan line number and bits 5-6 determine the cursor display mode. Cursor display is to begin on scan line 0 and blink at 1/16 the field rate. Calculations:

(a) Bit 6 Bit 5 Cursor display mode

0 0 Non-blink

0 1 Non-display

1 0 Blink, 1/16 field rate

1 1 Blink, 1/32 field rate

(b) R10 = 1000000 binary = 40H

Cursor end register (R11)—Sets cursor end scan line number. The cursor is to end on scan line number 7, making it eight scan lines long (0-7). Calculations:

(a) R11 = 7H

Start address register (H&L) (R12, R13)—Determines the first address output by the CRTC as a refresh address after vertical blanking. This example will start in video memory at address 0000H. Calculations:

(a) R14 = 0H

(b) R15 = 0H

Light pen register (H&L) (R16, R17)—Read only registers used to store contents of the address register (H&L) when the light pen input signal line to the CRTC goes high. Calculations:

(a) These registers are not programmed; they are read. For example, OUT 2,10 and IN 3,A causes the CPU to read light pen register 16 (10H) and place that data in the Z-80A accumulator (A register).

### CRTC Initializing Program

This Z-80A machine-language program loads the CRTC internal data registers, with the data calculated in the last section. If the hardware circuit is set to start the 4K video memory at CPU memory address 1000H, then the CRTC video memory output address 0000H actually starts at CPU memory address 1000H.

My Z-80A machine language pro-

PIN	NAME	I/O	SOURCE OR DESTINATION
1	A6	I	DATA SELECTOR (Y6)
2	A5	I	" " (Y5)
3	A4	I	" " (Y4)
4	A3	I	" " (Y3)
5	A0	I	" " (Y0)
6	A1	I	" " (Y1)
7	A2	I	" " (Y2)
8	$\overline{CS}$	I	2-4 NEG DECODER (01-04)
9	GND	I	POWER SUPPLY (GND)
10	$\overline{W}$	I	DATA SELECTOR (Y $\overline{W}$ )
11	D4	I/O	VIDEO MEMORY BUS (D7 or D3)
12	D3	I/O	" " " (D6 or D2)
13	D2	I/O	" " " (D5 or D1)
14	D1	I/O	" " " (D3 or D0)
15	A9	I	DATA SELECTOR (Y9)
16	A8	I	" " (Y8)
17	A7	I	" " (Y7)
18	VCC	I	POWER SUPPLY (+5)

Video Memory (2114).

PIN	NAME	I/O	SOURCE OR DESTINATION
1	CLR	I	(NC)
2	$\overline{Q_1}$	O	SYNC O.C. GATE
3	$\overline{Q_1}$	O	(NC)
4	D <sub>1</sub>	I	SYNC OR GATE
5	D <sub>2</sub>	I	REVERSE VIDEO EXCLUSIVE OR
6	$\overline{Q_2}$	O	(NC)
7	$\overline{Q_2}$	O	REVERSE VIDEO EXCLUSIVE OR
8	GND	I	POWER SUPPLY (GND)
9	CLK	I	TIMING SIGNAL ( $\overline{Q_2}$ )
10	$\overline{Q_3}$	O	BLANKING NAND
11	$\overline{Q_3}$	O	(NC)
12	D <sub>3</sub>	I	BLANKING 3-INPUT AND
13	D <sub>4</sub>	I	(NC)
14	$\overline{Q_4}$	O	(NC)
15	$\overline{Q_4}$	O	(NC)
16	VCC	I	POWER SUPPLY (+5)

Video Control Latch (74175).

PIN	NAME	I/O	SOURCE OR DESTINATION
1	DR	I/O	CPU $\overline{W}$ BUS LINE
2	A0	I/O	2114 (D0)
3	A1	I/O	" (D1)
4	A2	I/O	" (D2)
5	A3	I/O	" (D3)
6	A4	I/O	" (D4)
7	A5	I/O	" (D5)
8	A6	I/O	" (D6)
9	A7	I/O	" (D7)
10	GND	I	POWER SUPPLY (GND)
11	B7	I/O	CPU DATA BUS (D7)
12	B6	I/O	" " " (D6)
13	B5	I/O	" " " (D5)
14	B4	I/O	" " " (D4)
15	B3	I/O	" " " (D3)
16	B2	I/O	" " " (D2)
17	B1	I/O	" " " (D1)
18	B0	I/O	" " " (D0)
19	$\overline{E}$	I	VIDEO $\overline{MREQ}$ SIGNAL
20	VCC	I	POWER SUPPLY (+5)

Data Isolation Gate (74245).

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PIN	NAME	I/O	SOURCE OR DESTINATION
1	0	O	2114 BANK 0 ( $\overline{CE}$ )
2	1	O	" " 1 ( $\overline{CE}$ )
3	2	O	" " 2 ( $\overline{CE}$ )
4	3	O	" " 3 ( $\overline{CE}$ )
5	4	O	(NC)
6	5	O	(NC)
7	6	O	(NC)
8	GND	I	POWER SUPPLY (GND)
9	7	O	(NC)
10	8	O	(NC)
11	9	O	(NC)
12	D	I	(GND)
13	C	I	(GND)
14	B	I	DATA SELECTOR (Y11)
15	A	I	" " (Y10)
16	VCC	I	POWER SUPPLY (+5)

2-4 Line Negative Decoder (7442).

PIN	NAME	I/O	SOURCE OR DESTINATION
1	S	I	VIDEO MREQ SIGNAL
2	A1	I	CPU (A10, A8, A4, A0)
3	B1	I	CRTC (MA10, MA8, MA4, MA0)
4	Y1	O	2114 (A10, A8, A4, A0)
5	A2	I	CPU (A11, A9, A5, A1)
6	B2	I	CRTC (MA11, MA9, MA5, MA1)
7	Y2	O	2114 (A11, A9, A5, A1)
8	GND	I	POWER SUPPLY (GND)
9	Y3	O	2114 (A6, A2, $\overline{R/W}$ , NC)
10	B3	I	CRTC (MA6, MA2, +5V, NC)
11	A3	I	CPU (A6, A2, $\overline{W}$ , NC)
12	Y4	O	2114 (A7, A3, NC, NC)
13	B4	I	CRTC (MA7, MA3, NC, NC)
14	A4	I	CPU (A7, A3, NC, NC)
15	G	I	(GND)
16	VCC	I	POWER SUPPLY (+5)

Data Selector (74157).

gram is 38 bytes long, including the register data table at addresses 0016H-0025H. The program causes the Z-80A to load the CRTC starting with internal data register (R15) and completing with register (R0). The program first loads the address of the internal data register to be programmed into the CRTC address register out channel 2. Next, the internal register data to be programmed is loaded out of channel 3. In this program, the Z-80A C register holds the programmed channel number (2 or 3) and the B register holds the data to be programmed in the CRTC register with the address and data fields expressed in hexadecimal notation.

## Conclusion

I wasn't sure what to include in this article for photographs. I wanted to show graphics capability by using a

Provisions for more inputs  
and outputs give me  
the option of expanding  
the video memory  
at a later date  
by using CRTC and  
Z-80A bus address  
lines 12 and 13.

space-war display and I wanted to show the alphanumeric by using a text display. I finally decided to show both the graphics and alphanumeric capabilities of the character generator by continuously stepping through the TMS 4710 character generator patterns, alternating between normal video (video memory bit 7 low) and reverse video (bit 7 high). All three photographs are of displays using a video dot oscillator frequency of 10 MHz.

Photo 1 shows the results of the program listed in the previous section of this article. It shows a centered display of 27 rows of 53 characters per row. Photo 2 shows the same basic display, but with four scan line blanks between character rows. I did this by setting the max scan line address [CRTC register 9] to BH instead of 7H. Since there are no longer 27

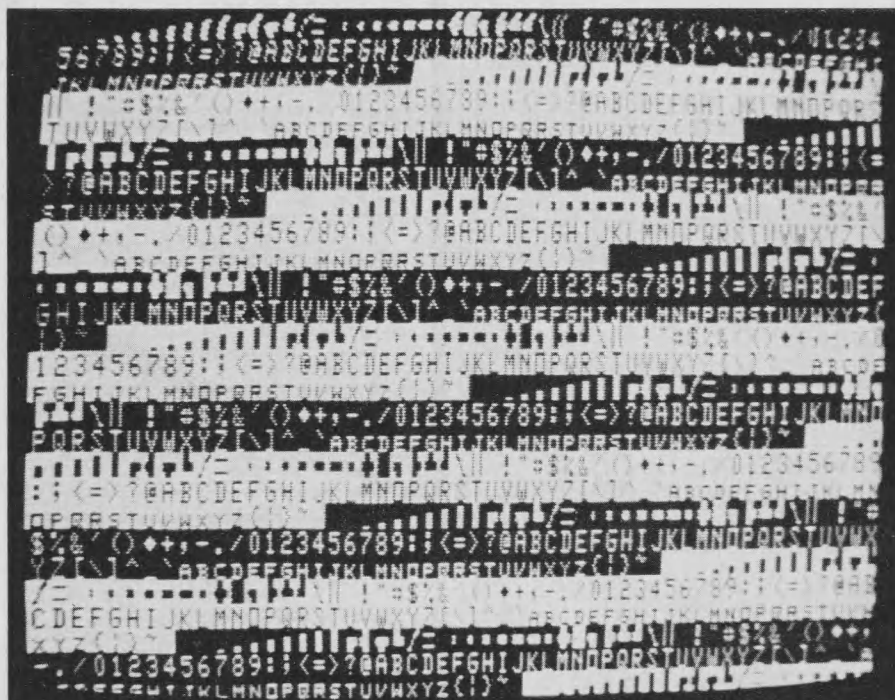


Photo 1. Screen centered display showing 27 rows of 53 characters per row using a 10 MHz oscillator frequency. The machine language in the article was used to program the display.

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character display rows, CRTC registers R4 through R7 also had to have new data inputs. The data changes are listed in the Photo 2 caption.

Photo 3 shows an interlace display and results from the same program as Photo 1 with one exception—the interlace mode register (R8) contains 3H instead of 0H. This results in twice the number of character display rows, or 54 rows. No other change was made. I allowed the display patterns to fill the TV screen even though there was some crowding and blurring at the edges. Normal display does not extend to the screen edges.

Fig. 2 is a schematic of the circuit I used for the Z-80A/MC6845 display device. The block titled "Z-80A system bus signals" represents the Z-80A bus signals conveniently. The Z-80A system bus drivers and interface circuits are not shown, since my display device is to interface with an existing Z-80A system. The I/O decode circuits were not shown for the same reasons. Note also that the two-to-four-line negative decoder (7442) and the bottom 2 to 1 data decoder IC (74157) have provisions

for more inputs and outputs. This gives me the option of expanding the video memory at a later date by using CRTC and Z-80A bus address lines 12 and 13. Some additional circuit changes would also have to be made. There are also some minor circuit dif-

ferences from the previous logic circuit diagrams.

I have included Fig. 3, which may help anyone planning to construct a similar video display device. It shows the pinout labels of the main integrated circuits I used. ■

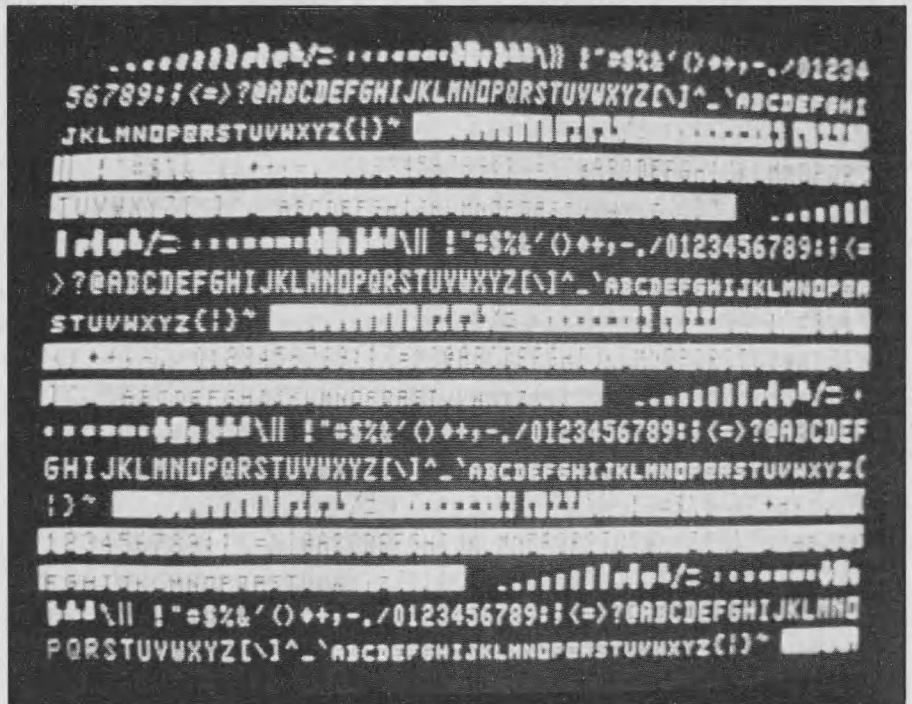


Photo 2. Same basic display as shown in Photo 1 but with four blank scan lines shown between the character rows. The same machine language program was used as for Photo 1 with the following CRTC register data changes: R4=15H; R6=11H; R7=13H; and R9=0BH.



Photo 3. Interlace display using the same machine language program as for Photo 1 but with CRTC register R8 now containing 03H (interlace mode). Notice there are now twice as many rows (54) as those shown in Photo 1 (27).

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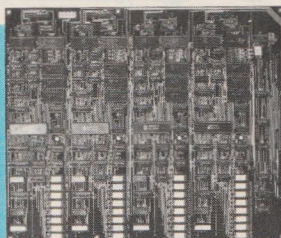
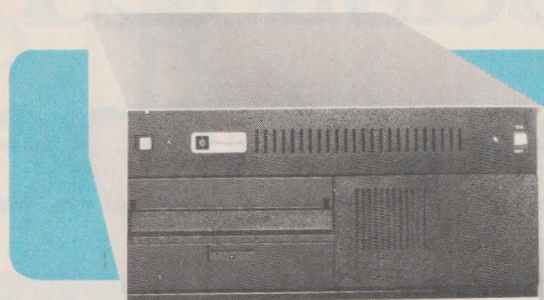
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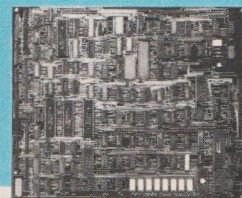


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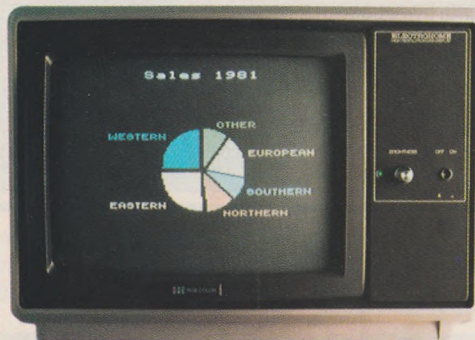
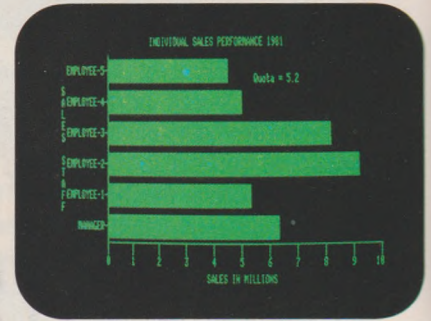
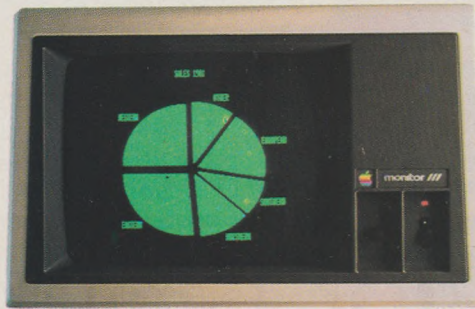


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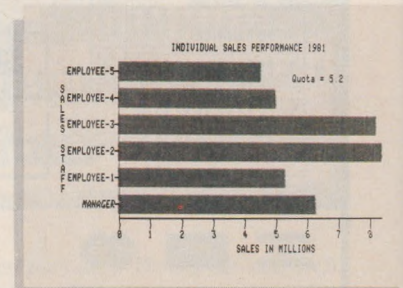
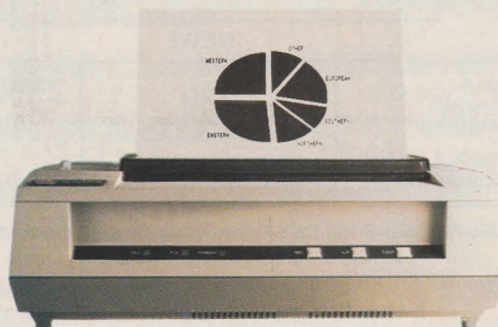
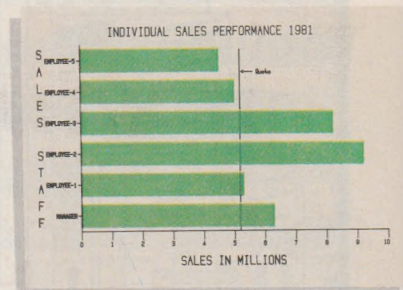
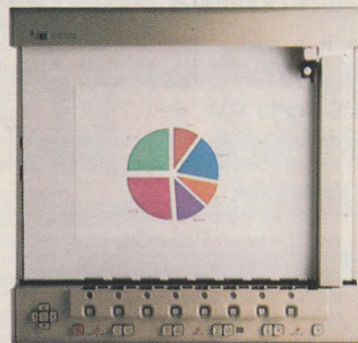
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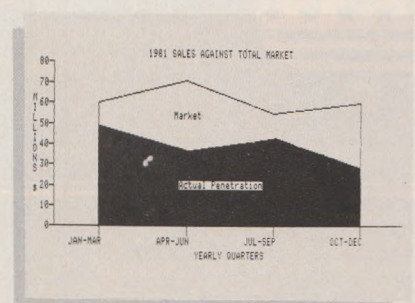
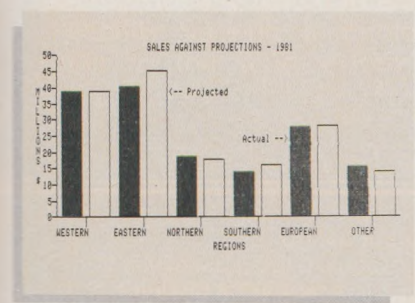
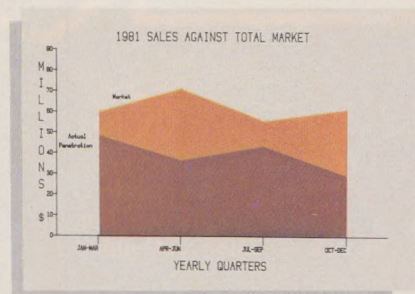
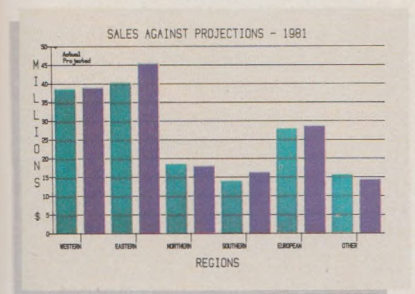
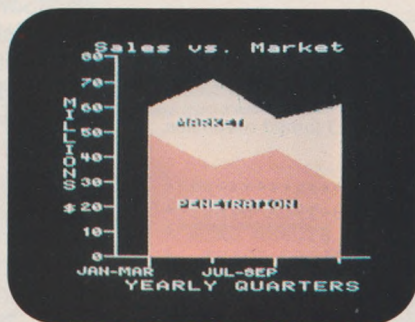
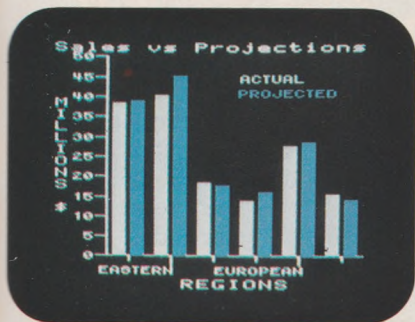
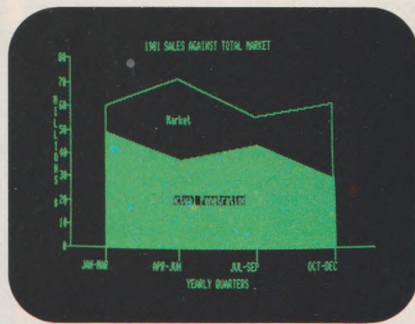
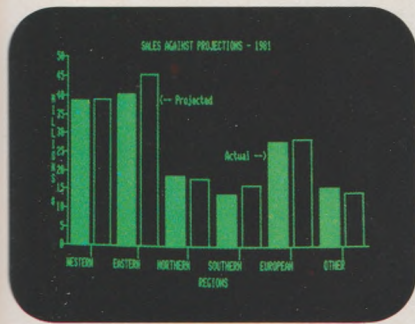
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# No Data File Is an Island

*Convert IBM 3740 format data files  
to ASCII, with Apple DOS 3.3.*

By Michael E. Brandt and Michael Simon Bodner

0C00-	A9	0C	A0	0A	20	D9	03	60
0C08-	00	00	01	70	02	00	00	15
0C10-	20	0C	00	20	00	00	01	00
0C18-	00	70	01	--	--	--	--	--
0C20-	00	01	EF	D8				

-- indicates any value.

*Listing 1. IBM disk read routine (6502 code).*

*Listing 2. Applesoft program for IBM 3740 format to DOS 3.3 format conversion.*

```
0 REM *****
1 REM * THIS PROGRAM READS IBM 3740 FORMAT 8-INCH DISK, *
2 REM * CONVERTS EBCDIC TO APPLE ASCII, AND STORES DATA *
3 REM * ON DOS FORMATTED APPLE 8-INCH DISK (LOBO DRIVE *
4 REM * AND SVA CONTROLLER ARE USED). SYNERGOS INC., *
5 REM * HOUSTON, TX. AUTHORS: M.E. BRANDT, M.S. BODNER *
6 REM *
7 REM *****
8 REM
9 REM ** TOP SIDE OF IBM DISK PROCESSED FIRST, THEN BOTTOM SIDE
10 REM
11 DIM X(256)
12 DS = CHR$(4):Z = 0:W = 15:M = 1:Y = 0:N = 1:A$(0) = "":U = 1
13 REM
14 REM ** Z IS TRACK NUMBER
15 REM ** W IS SECTOR NUMBER
16 REM ** M IS CITY STRING NUMBER
17 REM ** Y IS APPLE DISK TEXT FILE COUNTER
18 REM ** N IS CHARACTER INDEX
19 REM ** A$(0) IS STRING VARIABLE USED FOR EACH CITY STRING
20 REM ** X(I)'S ARE DATA READ FROM IBM DISK
21 REM ** U IS STRING COUNTER FOR EACH APPLE TEXT FILE WRITTEN TO
22 REM
23 B1$ = "IBMCITIES" + STR$(2 * Y)
24 PRINT DS;"BLOAD RWTS,S7,D1"
25 PRINT DS;"OPEN ";B1$;"L20,S7,D1"
26 POKE 3086,Z: POKE 3087,W: CALL 3072
27 REM
28 REM ** THIS POKES TRACK AND SECTOR NO. AND READS IBM DISK DATA
29 REM
30 FOR I = 1 TO 256:X(I) = PEEK(8191 + I):GOSUB 75
31 REM
32 REM ** NEXT SEVEN LINES CONVERT EBCDIC TO APPLE ASCII AND
33 REM ** STORED IN X(256)
34 REM
35 IF X(I) > 128 THEN X(I) = X(I) - 128: REM ** TURNS HIGH BIT
36 REM ** OFF FOR APPLE ASCII
37 NEXT I:GOTO 300
38 IF X(I) >= 193 AND X(I) < 202 THEN RETURN: REM ** A
39 REM ** THROUGH I
40 IF X(I) >= 209 AND X(I) < 218 THEN X(I) = X(I) - 7: RETURN:
41 REM ** J THROUGH R
42 IF X(I) >= 226 AND X(I) < 234 THEN X(I) = X(I) - 15:
43 RETURN: REM ** S THROUGH Z
```

If you have access to an IBM-generated 3740 format floppy disk containing a large number of mail labels or other data, you can acquire this data for your Apple program. This article describes a process for reading data from the IBM disk using the Apple II Plus, dual eight-inch Lobo floppy-disk drives, and the Sorrento Valley Associates' (SVA) disk 2+2 controller card (in Apple slot 7).

In this application, the reservations system of a large airline generated an IBM Series I data disk containing a list of world-wide airports and airlines along with their respective three- and two-character codes. Altogether there were 3564 airports and 580 airlines on the disk. We were looking for a technique to incorporate this information into our Apple-based product, the Synergos Travel Agency Accounting System (STAAS). This would let us translate airport and airline codes into their full name strings when generating air tickets and invoice/receipts.

Since the SVA controller card makes industry-standard eight-inch floppy-disk drives compatible with IBM 3740 format disks, we used the Apple DOS 3.3 Read, Write, Track and Sector (RWTS) routine to attempt to read the airline's IBM disk. The 6502 object code is provided in Listing 1. The routine is identical to that listed on page 95 of the (old) DOS 3.3 Reference Manual, except that the slot number is 7 (70 in \$C0B), the drive number is 2 (02 in \$C0C), the previous slot number accessed is 7

*Michael Brandt is instructor of electronics for Houston Community College. Michael Bodner is President and Chairman of the Board of Synergos, Inc., Houston, TX.*

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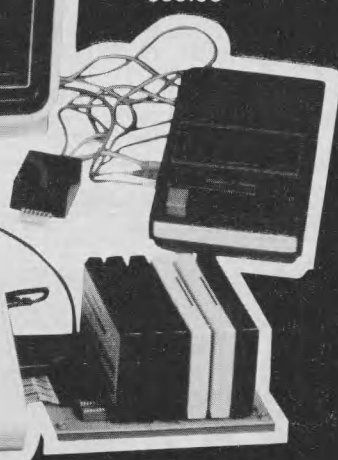
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Listing 2 continued.

```

86 IF X(I) = 64 THEN X(I) = 160: RETURN: REM ** SPACE CHARACTER
90 X(I) = 174: RETURN: REM ** ANYTHING ELSE IS '.'
95 REM
100 REM ** THIS NEXT ROUTINE FORMS 10 CITY STRINGS (24 CHAR.
    LONG),
110 REM ** WRITES EACH ONE TO RANDOM ACCESS APPLE DOS TEXT
    FILE,
120 REM ** AND KEEPS TRACK OF STRING AND IBM BLOCK NUMBERS
130 REM
300 A$(0) = "": FOR K = 1 TO 10
310 A$(0) = A$(0) + CHR$(X(N))
320 IF N = K * 24 THEN A$(0) = LEFT$(A$(0),19): PRINT D$;
    "WRITE ";B1$;"R";U: PRINT A$(0): GOSUB 490:M = M + 1:
    N = N + 1:U = U + 1:A$(0) = "":NEXT:N = 1: GOTO 350
330 N = N + 1: GOTO 310
335 REM
340 REM ** NEXT TWO LINES INCREMENT TRACK & SECTOR AND CHAIN
    BACK TO RWTS ROUTINE
345 REM
350 IF W = 25 THEN Z = Z + 1:W = - 1
360 W = W + 1: GOTO 40
370 REM
380 REM ** NEXT 5 LINES DETERMINE END OF EACH IBM BLOCK,
390 REM ** CLOSE PRECEDING APPLE TEXT FILE, OPEN NEXT APPLE TEXT
    FILE,
400 REM ** DETERMINE END OF TOP AND BOTTOM SIDES OF IBM DISK.
410 REM
490 IF PEEK (3084) = 2 AND M = 1707 THEN PRINT D$;"CLOSE ";B1$:
    GOTO 600
495 IF PEEK (3084) = 4 AND M = 1857 THEN PRINT D$;"CLOSE ";B1$:
    END
500 IF PEEK (3084) = 2 AND M = 110 + (Y * 130) THEN PRINT D$;
    "CLOSE ";B1$:Y = Y + 1: B1$ = LEFT$(B1$,9) +
    STR$(2 * Y): PRINT D$;"OPEN ";B1$;"L20,S7,D1":U = 0:
    RETURN
505 IF PEEK (3084) = 4 AND M = Y * 130 THEN PRINT D$;"CLOSE ";
    B1$:Y = Y + 1: B1$ = LEFT$(B1$,9) + STR$(2 * Y - 1):
    PRINT D$;"OPEN ";B1$;"L20,S7,D1":U = 0:RETURN

```

More

(70 in \$C19) and location \$C16 requires an 01 for the read operation.

We determined, empirically, that the first data string was located in track 0, sector 15 of the top side of the disk (Lobo drive number 2). Thus locations \$C0E and \$C0F are 00 and 15, respectively, in Listing 1. All other locations in RWTS are the same as the Apple version. When the routine is executed, 256 bytes are read in from the indicated track and sector and stored in locations \$2000 through \$2100.

We were provided with the following information: Each airport data string included the three-letter code followed immediately by a 15-letter airport or city name. If the city was in the U.S., a period immediately followed the name; otherwise, a space followed it. In either case this was followed by five blank spaces. Thus, each data string began every 24th byte.

Through experimentation with RWTS we learned that each track on the disk had 26 sectors (0-25) of 256 bytes each, and only ten tracks per side were used (0-9). The data was encoded in EBCDIC (Extended Binary Coded Decimal Interchange Code)

Circle 265 on Reader Service card.

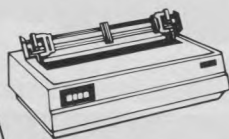
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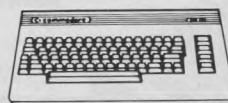
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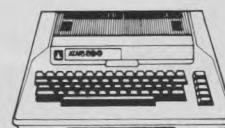
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and would have to be translated to Apple ASCII format. We also found that only ten data strings were included in each sector, so that 240 out of 256 bytes were being used per sector. This made the programming job easier, since the last 16 bytes were not used to chop off part of a data string.

Our first task was to generate a hard-copy printout of all the airports and see if it matched the master list produced by the Series I. We did this successfully for both top and bottom portions of the disk and discovered that the data was written in interleaved (top and bottom) 13-sector blocks. The first block on each side was apparently unused (no data could be read); and on the second block of the top, the first two sectors were unused.

We then wrote a program which would read the data in block format and create an Apple text file for each block. The Applesoft code is shown in Listing 2 (airport data strings only), and a flowchart is provided in Fig. 1.

The program processes all blocks on the top portion first, then creates even-numbered Apple text files for each block called IBMCIETES0, IBM-

#### Listing 2 continued.

```
510 RETURN
520 REM
530 REM ** NEXT TWO LINES RE-INITIALIZE PARAMETERS FOR BOTTOM
    SIDE PROCESSING,
540 REM ** REDEFINE APPLE TEXT FILE NAME FOR INTERLEAVING OF
    TEXT FILE COUNTER,
550 REM ** TELLS THE RWTS ROUTINE TO READ DRIVE 4 (BOTTOM SIDE),
    AND BRANCHES
560 REM
570 REM
600 Z = 0:W = 13:M = 1:Y = 1:N = 1:A$(0) = "":U = 1
610 B1$ = "IBMCITIES" + STR$(2 * Y - 1):POKE 3084,4: GOTO 35
```

CITIES2, IBMCITIES4, etc., up to IBMCITIES28 (see line 27). Line 13 initializes all variables (A\$(0) is used for each data string to increase processing speed). The RWTS routine is loaded in at line 30, and the first track and sector is poked in at line 40. The data is then read in (CALL 3072), and the EBCDIC to ASCII translation begins.

Table 1 shows the hexadecimal and decimal values for A through Z, period and space in EBCDIC and Apple ASCII. Lines 75 through 90 in Listing 2 convert each X(I) to regular ASCII, and line 60 converts this to Apple

ASCII by turning off the high bit. This conversion process is then repeated 255 times until each EBCDIC-encoded byte in locations \$2000 to \$2100 is an Apple ASCII byte in the array X(I).

Lines 300 through 330 partition the array into ten strings of 24 characters, lop off the last five of each (these are always spaces), and write each one to the appropriate IBMCITIES file. The subroutine in lines 490 through 510 determines whether or not to close the current text file, increment the file counter Y, and open the next text file.

Line 490 decides if processing of

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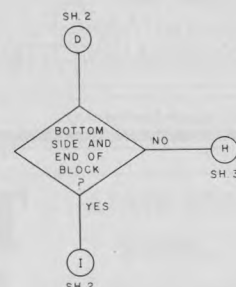
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CHAR.	EBCDIC (IN HEX)	EBCDIC (IN DEC.)	ASCII (IN HEX)	ASCII (IN DEC.)
A	C1	193	41	65
B	C1	194	42	66
C	C3	195	43	67
D	C4	196	44	68
E	C5	197	45	69
F	C6	198	46	70
G	C7	199	47	71
H	C8	200	48	72
I	C9	201	49	73
J	D1	209	4A	74
K	D2	210	4B	75
L	D3	211	4C	76
M	D4	212	4D	77
N	D5	213	4E	78
O	D6	214	4F	79
P	D7	215	50	80
Q	D8	216	51	81
R	D9	217	52	82
S	E2	226	53	83
T	E3	227	54	84
U	E4	228	55	85
V	E5	229	56	86
W	E6	230	57	87
X	E7	231	58	88
Y	E8	232	59	89
Z	E9	233	5A	90
SPACE	40	64	20	32
	--	--	2E	46

the top portion of the disk is complete. If so (the last string on top was found to be number 1707), then continue at line 600, which reinitializes parameters for bottom side processing. In this case location \$C0C (decimal 3084) is changed from 2 to 4 to correspond to Lobo drive number 4, and the text file string is redefined so that the counter is odd IBM CITIES1, IBM CITIES3, etc.). We then loop back to line 35.

Line 495 decides whether or not processing of the bottom portion of the disk is complete. If so, the program ends. The first readable block on the top contains only 110 strings since the first two sectors are unused, so that when Y=0 on the first go-around, IBMCIIES0 closes when M=110 (line 500). Line 505 performs the same function for the bottom of the disk. Here, each block except the last contains 130 strings.

112 *Microcomputing, February 1983*

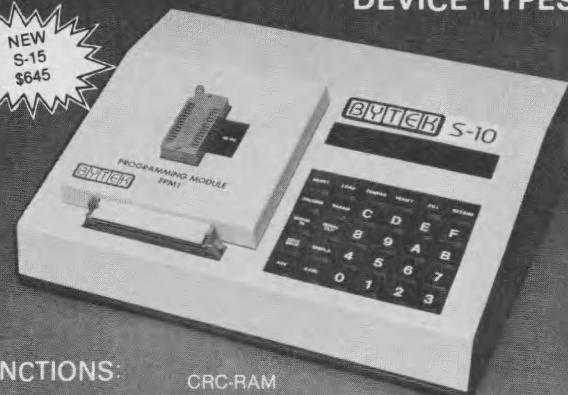
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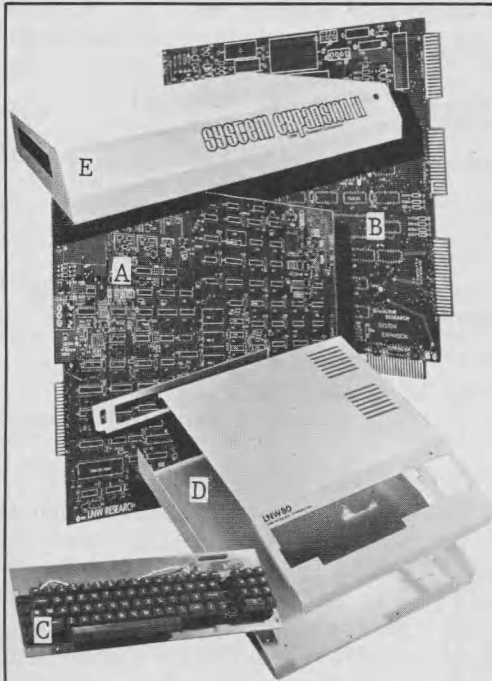
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```

0 REM *****
1 REM * THIS PROGRAM GENERATES A NEW FILE CALLED 'CITY.DAT' *
2 REM * WHICH EXTRACTS CITY STRINGS FROM THE 28 'IBMCITIES' *
3 REM * FILES. 3564 CITIES ARE THEN IN ALPHABETICAL ORDER IN *
4 REM * THE NEW FILE. THIS PROGRAM THEN PRINTS OUT ALL THE *
5 REM * CITIES. SYNERGOS INCORPORATED, HOUSTON, TX. AUTHORS: *
6 REM * M.S. BODNER, M.E. BRANDT. *
7 REM *****
10 REM
12 REM ** GENERATE NEW FILE
14 REM
20 F$ = "IBMCITIES"
30 D$ = CHR$(4):P$ = CHR$(12)
40 PRINT D$;"OPEN CITY.DAT,L20,S6,D1"
50 FOR J = 0 TO 27:G$ = F$ + STR$(J)
60 PRINT D$;"OPEN ";G$;"",L20,S6,D1"
70 N1 = 1:N2 = 130: IF J = 0 THEN N2 = 110
80 FOR I = N1 TO N2
90 PRINT D$;"READ ";G$;"",R";I
100 INPUT " ";A$(0)
110 K = K + 1
120 PRINT D$;"WRITE CITY.DAT,R";K: PRINT A$(0)
130 NEXT : PRINT D$;"CLOSE";G$
140 NEXT
150 PRINT
160 PRINT D$;"CLOSE"
163 REM
165 REM ** PRINTOUT PORTION
167 REM
170 PRINT D$;"PR#1"
180 PRINT P$
190 S = 1
200 Q$ = "-----"
-----1"
210 GOSUB 340
220 PRINT D$;"OPEN CITY.DAT,L20,S6,D1"
230 PRINT D$: PRINT D$;"READ CITY.DAT,R";1
233 REM
236 REM ** LINE 230 TREATS RANDOM ACCESS FILE LIKE SEQUENTIAL
    FILE
240 FOR K = 1 TO 3564
250 INPUT " ";A$(0)
260 IF K = 1 THEN PRINT "!";
270 PRINT RIGHT$( " " + STR$(K),4);" "; LEFT$( A$(0),3);
    " "; RIGHT$( A$(0),16);"!";
280 IF INT (K / 5) = K / 5 THEN PRINT : PRINT "!";
283 REM
285 REM ** THIS PUTS 5 CITIES PER LINE
287 REM
290 IF INT (K / 300) = K / 300 THEN PRINT Q$: PRINT P$:
    S = S + 1: GOSUB 340: PRINT "!";
293 REM
295 REM ** THIS PUTS 60 LINES PER PAGE
297 REM
300 NEXT
310 PRINT
320 PRINT D$;"CLOSE"
330 END
340 PRINT "                < SYNERGOS TRAVEL AGENCY ACCOUNT
    ING SYSTEM - CITY CODE DATA FILE    PAGE ";S;" ">": PRINT
    "!";Q$: RETURN
  
```

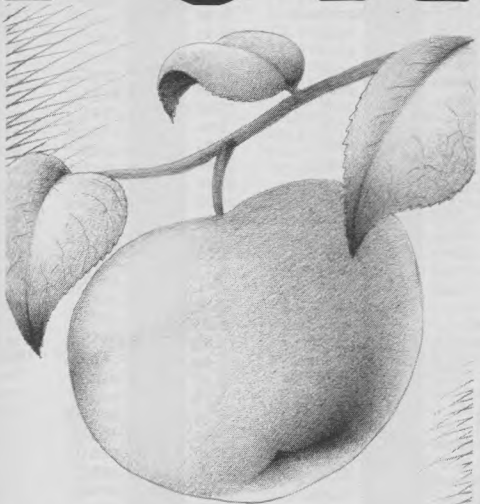
*Listing 3. Large DOS file generator and printout program.*

we had 29 Apple text files. We then wrote a program to create one huge file containing all the data strings in the 29 files. The code is shown in Listing 3. The second half of this program prints out all strings to provide a final verification of the data. The first half of the program is straightforward. In the last half, we turned on the printer at the top (line 170), and treated the CITY.DAT random access file as if it were a sequential access file in line

230. This is a neat little trick that you will enjoy using in your own programs.

At the end of the process we had generated a 67,716-byte text file which easily fits on a mini-floppy disk. Each string had an intrinsic address attached to it, which allowed us to use an ISAM program that we had written to perform rapid matching of three-character codes with appropriate airport data strings. ■

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74LS04	.24	74LS93	.55	74LS175	.55	74LS363	1.35
74LS05	.25	74LS95	.75	74LS181	2.15	74LS364	1.95
74LS08	.28	74LS96	.89	74LS189	8.95	74LS365	.49
74LS09	.29	74LS107	.39	74LS190	.89	74LS366	.49
74LS10	.25	74LS109	.39	74LS191	.89	74LS367	.45
74LS11	.35	74LS112	.39	74LS192	.79	74LS368	.45
74LS12	.35	74LS113	.39	74LS193	.79	74LS373	.99
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74LS47	.75	74LS153	.55	74LS257	.59	74LS670	1.49
74LS48	.75	74LS154	1.90	74LS258	.59	74LS674	9.65
74LS49	.75	74LS155	.69	74LS259	2.75	74LS682	3.20
74LS51	.25	74LS156	.69	74LS260	.59	74LS683	3.20
74LS54	.29	74LS157	.65	74LS266	.55	74LS684	3.20
74LS55	.29	74LS158	.59	74LS273	1.49	74LS685	3.20
74LS63	1.25	74LS160	.69	74LS275	3.35	74LS688	2.40
74LS73	.39	74LS161	.65	74LS279	.49	74LS689	3.20
74LS74	.35	74LS162	.69	74LS280	1.98	74LS783	24.95
74LS75	.39	74LS163	.65	74LS283	.69	81LS95	1.49
74LS76	.39	74LS164	.69	74LS290	.89	81LS96	1.49
74LS78	.49	74LS165	.95	74LS293	.89	81LS97	1.49
74LS83	.60	74LS166	1.95	74LS295	.99	81LS98	1.49
74LS85	.69	74LS168	1.75	74LS298	.89	25LS2521	2.80
				74LS299	1.75	25LS2569	4.25

### IC SOCKETS

8 pin ST	1-99	100
14 pin ST	.13	.11
16 pin ST	.15	.12
18 pin ST	.17	.13
20 pin ST	.20	.18
22 pin ST	.29	.27
24 pin ST	.30	.27
28 pin ST	.40	.32
40 pin ST	.49	.39
64 pin ST	4.25	call
ST = SOLDERTAIL		
8 pin WW	.59	.49
14 pin WW	.69	.52
16 pin WW	.69	.58
18 pin WW	.99	.90
20 pin WW	1.09	.98
22 pin WW	1.39	1.28
24 pin WW	1.49	1.35
28 pin WW	1.69	1.49
40 pin WW	1.99	1.80
WW = WIREWRAP		
16 pin ZIF	6.75	call
24 pin ZIF	9.95	call
28 pin ZIF	10.95	call
ZIF = TEXT TOOL (Zero Insertion Force)		

### CONNECTORS

RS232 MALE	2.95
RS232 FEMALE	3.50
RS232 FEMALE RIGHT ANGLE	5.25
RS232 HOOD	1.25
S-100 ST	3.95
S-100 WW	4.95

### DIP SWITCHES

4 POSITION	.85
5 POSITION	.90
6 POSITION	.90
7 POSITION	.95
8 POSITION	.95

### 7400

7400	.19	74132	.45
7401	.19	74136	.50
7402	.19	74141	.65
7403	.19	74142	2.95
7404	.19	74143	2.95
7405	.25	74145	.60
7406	.29	74147	1.75
7407	.29	74148	1.20
7408	.24	74150	1.35
7409	.19	74151	.55
7410	.19	74152	.65
7411	.25	74153	.55
7412	.30	74154	1.25
7413	.35	74155	.75
7414	.49	74156	.65
7416	.25	74157	.55
7417	.25	74159	1.65
7420	.19	74160	.85
7421	.35	74161	.69
7422	.35	74162	.85
7423	.29	74163	.69
7425	.29	74164	.85
7426	.29	74165	.85
7427	.29	74166	1.00
7428	.45	74167	2.95
7430	.19	74170	1.65
7432	.29	74172	5.95
7433	.45	74173	.75
7437	.29	74174	.89
7438	.29	74175	.89
7440	.19	74176	.89
7442	.49	74177	.75
7443	.65	74178	1.15
7444	.69	74179	1.75
7445	.69	74180	.75
7446	.69	74181	2.25
7447	.69	74182	.75
7448	.69	74184	2.00
7450	.19	74185	2.00
7451	.23	74186	18.50
7453	.23	74190	1.15
7454	.23	74191	1.15
7460	.23	74192	.79
7470	.35	74193	.79
7472	.29	74194	.85
7473	.34	74195	.85
7474	.33	74196	.79
7475	.45	74197	.75
7476	.35	74198	1.35
7480	.59	74199	1.35
7481	1.10	74221	1.35
7482	.95	74246	1.35
7483	.50	74247	1.25
7485	.59	74248	1.85
7486	.35	74249	1.95
7489	2.15	74251	.75
7490	.35	74259	2.25
7491	.40	74265	1.35
7492	.50	74273	1.95
7493	.35	74276	1.25
7494	.65	74279	.75
7495	.55	74283	2.00
7496	.70	74284	3.75
7497	2.75	74285	3.75
74100	1.75	74290	.95
74107	.30	74293	.75
74109	.45	74298	.85
74110	.45	74351	2.25
74111	.55	74365	.65
74116	1.55	74366	.65
74120	1.20	74367	.65
74121	.29	74368	.65
74122	.45	74376	2.20
74123	.49	74390	1.75
74125	.45	74393	1.35
74126	.45	74425	3.15
74128	.55	74426	.85
		74490	2.55

### CMOS

4000	.29	4527	1.95
4001	.25	4528	1.19
4002	.25	4531	.95
4006	.89	4532	1.95
4007	.29	4538	1.95
4008	.95	4539	1.95
4009	.39	4541	2.64
4010	.45	4543	1.19
4011	.25	4553	5.79
4012	.25	4555	.95
4013	.38	4556	.95
4014	.79	4581	1.95
4015	.39	4582	1.95
4016	.39	4584	.75
4017	.69	4585	.75
4018	.79	4702	12.95
4019	.39	74C00	.35
4020	.75	74C02	.35
4021	.79	74C04	.35
4022	.79	74C08	.35
4023	.29	74C10	.35
4024	.65	74C14	.59
4025	.29	74C20	.35
4026	1.65	74C30	.35
4027	.45	74C32	.39
4028	.69	74C42	1.29
4029	.79	74C48	1.99
4030	.39	74C73	.65
4034	1.95	74C74	.65
4035	.85	74C76	.80
4040	.75	74C83	1.95
4041	.75	74C85	1.95
4042	.69	74C86	.39
4043	.85	74C89	4.50
4044	.79	74C90	1.19
4046	.85	74C93	1.75
4047	.95	74C95	.99
4049	.35	74C107	.89
4050	.35	74C150	5.75
4051	.79	74C151	2.25
4053	.79	74C154	3.25
4060	.89	74C157	1.75
4066	.39	74C160	1.19
4068	.39	74C161	1.19
4069	.29	74C162	1.19
4070	.35	74C163	1.19
4071	.29	74C164	1.39
4072	.29	74C165	2.00
4073	.29	74C173	.79
4075	.29	74C174	1.19
4076	.79	74C175	1.19
4078	.29	74C192	1.49
4081	.29	74C193	1.49
4082	.29	74C195	1.39
4085	.95	74C200	5.75
4086	.95	74C221	1.75
4093	.49	74C373	2.45
4098	2.49	74C374	2.45
4099	1.95	74C901	.39
14409	12.95	74C902	.85
14410	12.95	74C903	.85
14411	11.95	74C905	10.95
14412	12.95	74C906	.95
14419	7.95	74C907	1.00
14433	4.18	74C908	2.00
4502	.95	74C909	2.75
4503	.65	74C911	8.95
4508	1.95	74C912	8.95
4510	.85	74C914	1.95
4511	.85	74C915	1.19
4512	.85	74C918	2.75
4514	1.25	74C920	17.95
4515	1.79	74C921	15.95
4516	1.55	74C922	4.49
4518	.89	74C923	4.95
4519	.39	74C925	5.95
4520	.79	74C926	7.95
4522	1.25	74C928	7.95
4526	1.25	74C929	19.95

### Prices Slashed! 74S00

74S00	.32	74S163	1.95
74S02	.35	74S168	3.95
74S03	.35	74S169	3.95
74S04	.35	74S174	.95
74S05	.35	74S175	.95
74S08	.35	74S181	3.95
74S09	.40	74S182	2.95
74S10	.35	74S188	1.95
74S11	.35	74S189	6.95
74S15	.35	74S194	1.49
74S20	.35	74S195	1.49
74S22	.35	74S196	1.49
74S30	.35	74S197	1.49
74S32	.40	74S201	6.95
74S37	.88	74S225	7.95
74S38	.85	74S240	2.20
74S40	.35	74S241	2.20
74S51	.35	74S244	2.20
74S64	.40	74S251	.95
74S65	.40	74S253	.95
74S74	.50	74S257	.95
74S85	1.99	74S258	.95
74S86	.50	74S260	.79
74S112	.50	74S274	19.95
74S113	.50	74S275	19.95
74S114	.55	74S280	1.95
74S124	2.75	74S287	1.90
74S132	1.24	74S288	1.90
74S133	.45	74S289	6.89
74S134	.50	74S301	6.95
74S135	.89	74S373	2.45
74S138	.85	74S374	2.45
74S139	.85	74S381	7.95
74S140	.55	74S387	1.95
74S151	.95	74S412	2.98
74S153	.95	74S471	4.95
74S157	.95	74S472	4.95
74S158	.95	74S474	4.95
74S161	1.95	74S482	15.25
74S162	1.95	74S570	2.95
		74S571	2.95



## LINEAR

LM301	.34	LM348	.99	NE564	2.95	LM1496	.85
LM301H	.79	LM350K	4.95	LM565	.99	LM1558H	3.10
LM307	.45	LM350T	4.60	LM566	1.49	LM1800	2.37
LM308	.69	LM358	.69	LM567	.89	LM1812	8.25
LM308H	1.15	LM359	1.79	NE570	3.95	LM1830	3.50
LM309H	1.95	LM376	3.75	NE571	2.95	LM1871	5.49
LM309K	1.25	LM377	1.95	NE592	2.75	LM1872	5.49
LM310	1.75	LM378	2.50	LM703	.89	LM1877	3.25
LM311	.64	LM379	4.50	LM709	.59	LM1889	1.95
LM311H	.89	LM380	.89	LM710	.75	LM1896	1.75
LM312H	1.75	LM380N-8	1.10	LM711	.79	LM2877	2.05
LM317K	3.95	LM381	1.60	LM723	.49	LM2878	2.25
LM317T	1.19	LM382	1.60	LM723H	.55	LM2900	.85
LM318	1.49	LM383	1.95	LM733	.98	LM2901	1.00
LM318H	1.59	LM384	1.95	LM741	.35	LM3900	.59
LM319H	1.90	LM386	.89	LM741N-14	.35	LM3905	1.25
LM319	1.25	LM387	1.40	LM741H	.40	LM3909	.98
LM320 (see 7900)		LM389	1.35	LM747	.69	LM3911	2.25
LM322	1.65	LM390	1.95	LM748	.59	LM3914	3.95
LM323K	4.95	LM392	.69	LM1014	1.19	LM3915	3.95
LM324	.59	LM394H	4.60	LM1303	1.95	LM3916	3.95
LM329	.65	LM399H	5.00	LM1310	1.49	MC4024	3.95
LM331	3.95	NE531	2.95	MC1330	1.69	MC4044	4.50
LM334	1.19	NE536	6.00	MC1349	1.89	RC4136	1.25
LM335	1.40	NE555	.34	MC1350	1.19	RC4151	3.95
LM336	1.75	NE556	.65	MC1358	1.69	LM4250	1.75
LM337K	3.95	NE558	1.50	MC1372	6.95	LM4500	3.25
LM337T	1.95	NE555	.34	LM1414	1.59	LM13080	1.29
LM338K	6.95	NE556	.65	LM1458	.59	LM13600	1.49
LM339	.99	NE558	1.50	LM1488	.69	LM13700	1.49
LM340 (see 7800)		NE561	24.95	LM1489	.69		

H = TO-5 CAN

T = TO-220

K = TO-3

## RCA

CA 3023	2.75	CA 3082	1.65
CA 3039	1.29	CA 3083	1.55
CA 3046	1.25	CA 3086	.80
CA 3059	2.90	CA 3089	2.99
CA 3060	2.90	CA 3096	3.49
CA 3065	1.75	CA 3130	1.30
CA 3080	1.10	CA 3140	1.15
CA 3081	1.65	CA 3146	1.85
		CA 3160	1.19

## TI

TL494	4.20	75365	1.95
TL496	1.65	75450	.59
TL497	3.25	75451	.39
75107	1.49	75452	.39
75110	1.95	75453	.39
75150	1.95	75454	.39
75154	1.95	75491	.79
75188	1.25	75492	.79
75189	1.25	75493	.89
		75494	.89

## BI FET

TL071	.79	TL084	2.19
TL072	1.19	LF347	2.19
TL074	2.19	LF351	.60
TL081	.79	LF353	1.00
TL082	1.19	LF355	1.10
TL083	1.19	LF356	1.10
		LF357	1.40

## VOLTAGE REGULATORS

7805T	.89	7905T	.99
7808T	.89	7908T	.99
7812T	.89	7912T	.99
7815T	.89	7915T	.99
7824T	.89	7924T	.99
7805K	1.39	7905K	1.49
7812K	1.39	7912K	1.49
7815K	1.39	7915K	1.49
7824K	1.39	7924K	1.49
78L05	.69	79L05	.79
78L12	.69	79L12	.79
78L15	.69	79L15	.79
78H05K	9.95	LM323K	4.95
78H12K	9.95	UA78S40	1.95

T = TO-220

K = TO-3

L = TO-92

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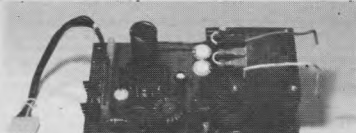
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4007	3 1/2 Digit A/D LED-DC HLD	16.95
4008	3 1/2 Digit A/D LED-DC HLD	15.95
4009	Low Battery Volt Indicator	2.25
4010	CMOS LED Stopwatch/Timer	12.95
4011	Stopwatch LED	14.95
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4013	Time Generator	7.95
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4015	Oscillator Controller	8.95
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4017	Seven Decade Counter	15.95
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4020	Stopwatch Chip, XTL	14.95
4021	8 Digit Univ. Counter/Ctr	29.95
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4045	Monostable Multivibrator	2.95
4046	Monostable Multivibrator	2.95
4047	Monostable Multivibrator	2.95
4048	Monostable Multivibrator	2.95
4049	Monostable Multivibrator	2.95
4050	Monostable Multivibrator	2.95
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4052	Monostable Multivibrator	2.95
4053	Monostable Multivibrator	2.95
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4055	Monostable Multivibrator	2.95
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4064	Monostable Multivibrator	2.95
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4066	Monostable Multivibrator	2.95
4067	Monostable Multivibrator	2.95
4068	Monostable Multivibrator	2.95
4069	Monostable Multivibrator	2.95
4070	Monostable Multivibrator	2.95
4071	Monostable Multivibrator	2.95
4072	Monostable Multivibrator	2.95
4073	Monostable Multivibrator	2.95
4074	Monostable Multivibrator	2.95
4075	Monostable Multivibrator	2.95
4076	Monostable Multivibrator	2.95
4077	Monostable Multivibrator	2.95
4078	Monostable Multivibrator	2.95
4079	Monostable Multivibrator	2.95
4080	Monostable Multivibrator	2.95
4081	Monostable Multivibrator	2.95
4082	Monostable Multivibrator	2.95
4083	Monostable Multivibrator	2.95
4084	Monostable Multivibrator	2.95
4085	Monostable Multivibrator	2.95
4086	Monostable Multivibrator	2.95
4087	Monostable Multivibrator	2.95
4088	Monostable Multivibrator	2.95
4089	Monostable Multivibrator	2.95
4090	Monostable Multivibrator	2.95
4091	Monostable Multivibrator	2.95
4092	Monostable Multivibrator	2.95
4093	Monostable Multivibrator	2.95
4094	Monostable Multivibrator	2.95
4095	Monostable Multivibrator	2.95
4096	Monostable Multivibrator	2.95
4097	Monostable Multivibrator	2.95
4098	Monostable Multivibrator	2.95
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10	14	75	74C95	1	19	74C93	20	2.49
10	14	75	74C95	1	24	74C93	20	2.49
10	14	35	74C151	16	348	74C73A	20	2.49
10	14	35	74C151	16	348	74C73A	20	2.49
20	14	35	74C157	16	225	74C903	14	59
30	14	35	74C186	16	19	74C906	14	59
40	14	35	74C186	16	19	74C911	14	59
42	16	1	74C162	16	19	74C912	28	8.95
48	16	1.35	74C163	16	19	74C915	18	11.49
48	16	1.35	74C163	16	19	74C915	18	11.49
74	14	60	74C173	15	75	74C922	18	4.49
85	16	1.95	74C174	16	19	74C923	20	4.49
85	16	1.95	74C174	16	19	74C923	20	4.49
85	16	1.95	74C192	16	49	74C926	18	3.95
90	14	1.19	74C192	16	69	80C95	16	3.95
100	14	1.71	74C193	16	38	80C97	16	3.95

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H002	14	75	74HC138	16	49	74HC243	13	2.79
H002	14	75	74HC139	16	49	74HC251	16	1.79
H002	14	75	74HC139	16	49	74HC251	16	1.79
H008	14	75	74HC151	16	19	74HC280	24	4.95
H010	14	75	74HC157	16	19	74HC282	24	4.95
H010	14	75	74HC157	16	19	74HC282	24	4.95
H012	14	75	74HC161	16	79	74HC533	20	3.95
H012	14	75	74HC161	16	79	74HC533	20	3.95
H014	14	99	74HC194	14	79	74HC534	20	3.95
H016	14	75	74HC213	16	39	74HC535	14	2.79
H089	16	1.39	74HC245	14	29	74HC4538	16	2.95
H089	16	1.39	74HC245	14	29	74HC4538	16	2.95
H089	16	1.39	74HC242	14	279	74HC4543	16	2.95

*CMOS is unbuffered. All other data are buffered.*

**Save \$5.30 for Data Sheet**

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11266	20	Hex 12-Input AND-OR Gate Array (High Output)	\$5.95
11266	20	Hex 12-Input AND-OR Gate Array (High Output)	\$5.95
11266	20	Hex 12-Input AND-OR Gate Array (High Output)	\$5.95
11266	20	Hex 12-Input AND-OR Invert Gate Array (Low Output)	\$5.95
11266	20	Hex 12-Input AND-OR Invert Gate Array (Low Output)	\$5.95
11266	20	Hex 12-Input AND-OR Invert Gate Array (Low Output)	\$5.95
11266	20	Hex 12-Input AND-OR Invert Gate Array (Low Output)	\$5.95

1616	20	Hex Input Register AND-OR Gate Array	9.95			
1616	20	Hex Input Register AND-OR Gate Array	9.95			
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<b>2011 1982 NATIONAL PAL-DAT Gate Array (176p) . . . \$5.95</b>						
727CPC	8	73	LINEAR	N570N	16	339
727CPC	8	1.39	13	LM703CN	8	119
727CPC	8	1.95	14	LM703CN	8	119
727CPC	8	1.95	15	LM703CN	8	119
727CPC	8	1.95	16	LM703CN	8	119
727CPC	8	1.95	17	LM703CN	8	119
727CPC	8	1.95	18	LM703CN	8	119
727CPC	8	1.95	19	LM703CN	8	119
727CPC	8	1.95	20	LM703CN	8	119
727CPC	8	1.95	21	LM703CN	8	119
727CPC	8	1.95	22	LM703CN	8	119
727CPC	8	1.95	23	LM703CN	8	119
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727CPC	8	1.95	27	LM703CN	8	119
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727CPC	8	1.95	207	LM703CN	8	119
727CPC	8	1.95	208	LM703CN	8	119
727CPC	8	1.95	209	LM703CN	8	119
727CPC	8	1.95	210	LM703CN	8	119
727CPC	8	1.95	211	LM703CN	8	119
727CPC	8	1.95	212	LM703CN	8	119
727CPC	8	1.95	213	LM		

333N	1.65	LM505N	1.15	LM505N	1.15	LM505N	1.15	LM505N	1.15
333N	1.65	LM505N	1.15	LM505N	1.15	LM505N	1.15	LM505N	1.15
342N	1.35	LM505N	1.15	LM505N	1.15	LM505N	1.15	LM505N	1.15
342N	1.35	LM505N	1.15	LM505N	1.15	LM505N	1.15	LM505N	1.15
342N	1.35	LM505N	1.15	LM505N	1.15	LM505N	1.15	LM505N	1.15

**Digitaltalker™**

**DT1050 — Applications: Teaching aids, appliances, clocks, automotive, telecommunications, language translations, etc.**

The DT1050 is a standard DIGITALTALKER kit endowed with 137 separate idiosyncratic words, 2 tones, and 5 different silence durations. The words and tones have been assigned discrete addresses, making it possible to output single words or words concatenated into phrases and sentences. The "voice" output of the DT1050 is a highly intelligible male voice. Female and children's voices can be synthesized. The vocabulary is chosen so that it is applicable to many professions and markets.

The DT1050 consists of a Speech Professor Chip, MM54014 (40-pin) and two (2) Speech ROMs: MM52164SR1 and MM52164SR2 (24-pin) along with a Master Word list and a recommended schematic diagram on the application sheet.

**DT1050 Digitaltalker™ ..... \$34.95 ea.**

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4.000 2.49	10.8864	1.49
4.433618 .75	11.088	1.59
4444.000 1.25	14.31818	2.49
4.916 Bd. Rate 1.99		

## CPU

8080A 2.00	8085 5.95
8035 2.95	8085A-2 9.50
8039 3.95	8748 15.95
6100 4.50	6802 5.00

## 8080 SUPPORT

8212 1.50	8251 3.95
8214 2.00	8253 2.95
8216 1.50	8255 3.25
8224 1.50	8275 19.95
8228 3.00	

## 74LS

LS00 .24	LS32 .36	LS132 .50	LS164 .60	LS241 .80	LS293 .85
LS02 .24	LS42 .49	LS133 .49	LS166 .99	LS242 .90	LS298 .89
LS04 .24	LS74 .30	LS138 .50	LS169 1.25	LS243 .90	LS367 .40
LS05 .24	LS85 .60	LS139 .50	LS174 .50	LS244 .90	LS368 .40
LS08 .24	LS86 .39	LS151 .50	LS175 .50	LS245 1.50	LS373 .99
LS10 .24	LS90 .50	LS153 .50	LS181 1.99	LS257 .45	LS374 .75
LS12 .30	LS93 .55	LS154 1.75	LS191 .90	LS258 .45	LS375 1.19
LS14 .50	LS109 .39	LS155 .50	LS192 .80	LS266 .50	LS377 1.49
LS20 .24	LS112 .39	LS157 .60	LS193 .80	LS273 1.25	LS390 1.19
LS21 .25	LS123 .75	LS161 .60	LS195 .65	LS279 .45	LS393 1.19
LS27 .24	LS124 2.75	LS162 .65	LS221 .80	LS283 .60	LS399 .99
LS30 .24	LS125 .45	LS163 .50	LS240 .75	LS290 .85	

## VOLTAGE REGULATOR

723C ....	3/1.10
78M05 - +5v - 500 MA	
TO 220 ....	3/1.10
7805 .99	7905 .99
7808 .99	7912 .99
7812 .99	7915 .99
7815 .99	7924 .99
7824 .99	
LM317T - TO 220 ....	1.10
LM323K-+5v-3A.	
TO-3 ....	3.50 3/9.00
LAS 1412-+12v-3A	
TO-3 ....	3.50 3/9.00
7812CK-TO-3 +12V, 1A ....	1.00
7905-TO-3 -5v 1A ....	1.00

## MISCELLANEOUS

AY3-8910 w/60 pg. manual ...	9.95
8T97 ....	.49
MC 1408L6 D to A 8 Bit ....	1.79
8002 Char. Gen. ....	11.95
DM8131 ....	1.50

UART	TR1602-UART same as	
	AY5-1013 ....	1.99
	IM6402-+5v High speed	
FDC	UART-AY5-1013 pin out ....	1.65
	INS 8250B ....	9.95
	1771 Single Density FDC ....	17.50
CRT CONT.	1791 Double Density FDC ....	23.50
	1797 - FDC ....	20.95
	5027 Programmable-24x80 ...	10.95
	5037 ....	14.95
	68B45 - Motorola (HD46505SP)	
	CRT Controller - 2MHZ ....	17.50

## BIT SLICE

AMD2901-4 Bit Slice ....	7.95
AMD2903-4 Bit Super	
Slice ....	12.95
AMD2911 Sequencer ....	3.95
AMD29705-16 Register	
Files ....	4.95

## BAUD RATE GENERATOR

COM8116 ....	9.50
INS8250B ....	9.95

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Z80PIO - Parallel ....	3.95
Z80SIO/O Chan. Ser. ....	16.95
Z80A-4MHZ CPU ....	4.95
Z80A DART ....	9.95
Z80A-PIO ....	5.95
Z80A SIO/O ....	19.95
Z80B 6 MHZ CPU ....	14.95

## EPROM SPECIAL

We bought a large quantity of 2708s from a computer manufacturer who redesigned their boards. We removed them from sockets, erased and verified them, and now we offer the savings to you. Complete satisfaction guaranteed.

2708

\$1.49 or 10/\$12.00

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2708 1KX8 450 n.s. ....	2.20
27A08 1KX8 350 n.s. ....	3.95
2758 1KX8 +5V 450 n.s. ....	3.95
2716 2KX8+5V	
450 n.s. ....	3.20
2716-1 2KX8+5v 350 n.s. ....	7.95
2732 4KX8 450 n.s. Intel P. O. ...	4.75
2732A-2 200 n.s. Special ....	6.95
2732A-3 4K x 8 300 n.s. L.P.	
Special ....	5.95
2532 4KX8 450 n.s. T.I. P. O. ....	7.00
2764 - 450 n.s. ....	9.95

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14 Pin	10/1.00
16 Pin	8/1.00
18 Pin	8/1.00
20 Pin	7/1.00
24 Pin	6/1.00
28 Pin	6/1.00
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WE'VE CAPTURED THE 8" FLOPPY DRIVE MARKET  
WITH A HUGE FACTORY DIRECT PURCHASE!!



**FDD100-8  
8" FLOPPY**

**WOW!!**

**SINGLE-SIDED  
DOUBLE DENSITY  
90 DAY WARRANTY  
SHUGART 801R COMPATIBLE**

## DUAL 8" SUBSYSTEM

KNCCS2422A Controller w/CP/M 2.2 1 \$425.00  
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IN A DUAL HORIZONTAL CABINET  
WITH POWER SUPPLY  
AND DATA CABLE

SAVE \$258.00

**\$995.00**

(Include \$30.00 for shipping)  
Same as above, with CCS2810 Z80  
4MHz CPU and CCS 2065 64K Dynamic RAM:

**\$1390.00**

K PDBSIESUB2

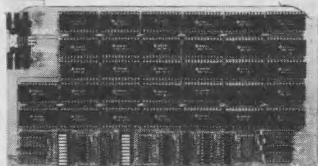
**\$265.00 1**  
**\$249.00 2-9**  
**\$225.00 10+**  
KNSIEFDD1008  
OEM INQUIRIES INVITED  
(Include \$7.00 per drive for shipping)

**DON'T MISS OUT!**

## CompuPro™ 10MHz 64KBytes \$299.00\*

- S-100 STATIC RAM • ULTRA LOW POWER • ONLY 2 WATTS! • ASSEMBLED & TESTED • ONE YEAR WARRANTY

### RAM 17

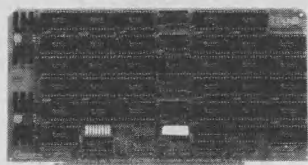


SALE PRICE: **\$319.00 ea.**  
List Price: \$599.00

2 OR MORE: **\$299.00 ea.**

KNGBTRAM17 Assembled & Tested

### RAM 16



8 or 16 bit data transfers

SALE PRICE: **\$349.00 ea.**  
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2 OR MORE: **\$325.00 ea.**

KNGBTRAM16 Assembled & Tested

## Tandon



**8-INCH  
THIN LINE**

Exactly one-half the height of any other model.  
Proprietary, high-resolution, read-write heads patented by Tandon

D.C. only operation - no A.C. required  
Industry standard interface

Three milisecond track-to-track access time (9 lbs.)

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KNTNDTM1002 Double Sided, 500KB \$295.00 ea.  
2 or More: \$270.00 each  
KNTNDTM1003 Single Sided, 500KB \$295.00 ea.  
2 or More: \$270.00 each  
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**JMR**

- Fan cooled
- 24V @ 4A/5A Surge
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Includes Power Cables



*International  
Instrumentation  
Incorporated*



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- Modular power connectors

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DUAL 8" SIEMENS FDD1008,  
DUAL 8" CABINET POWER SUPPLY

IF BOUGHT SEPARATELY: \$910.00

PRICED AT: **\$750.00**

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Temperature and voltage monitor with visual and audible alarm for overtemp condition. Direct Digital Readout of Internal temperature in C on standard DVM

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KNPDBIISIEEM 2-Drives Cabinet & disk environment monitor \$825.00  
KNIIIFDE002EM Cabinet only with disk environment monitor \$375.00  
KNPBC50M18E18E Dual Power Cable \$31.15

## VISUAL 50

- Low profile detached keyboard features sculptured keys with matte finish
- Screen tilts and swivels
- 80 x 24 display with 25th status line
- 7 x 9 dot matrix with full decoders
- RS-232 Serial interface w/auxiliary RS-232 port
- 128 Character ASCII set and 31 character line drawing set



## INTRODUCTORY OFFER!!

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(Shipping Weight 37 lbs.)



**NEW  
LOW PRICES!**



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KNMPI51\* Single-Sided Double-Density 48 TPI \$200.00  
KNMPI52\* Double-Sided Double-Density 48 TPI \$270.00  
KNMPI91\* Single-Sided Double-Density 96 TPI \$275.00  
KNMPI92\* Double-Sided Double-Density 96 TPI \$400.00

\*Replace "\*" when order, with "m" for MPI style bezel, or "s" for Shugart style bezel. (Shipping Weight: 5 lbs.)

### 2" HIGH 8" DISK DRIVES



The first 2" high 8" disk drive allows for mounting under the keyboard on CRT, etc.  
NO AC Required +5V +24VDC only  
FAST 3 msec track to track!

KNMPI41M 1/2 High 1 side double-density \$380.00  
KNMPI42M 1/2 High 2 side double-density \$460.00  
KNMPI41S Full height 1 side single drive, dble-density \$380.00  
KNMPI42S Full height 2 sides single drive, dble-density \$460.00  
KNMPI41D Full height 1 side dual drive, dble-density \$760.00  
KNMPI42D Full height 2 side dual drive, dble-density \$920.00  
(Shipping Weight: 11 lbs. per drive.)

# PRIORITY ONE ELECTRONICS

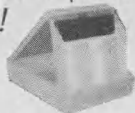
## 5" DISKETTES

SOFT SECTOR  
40 TRACK SINGLE SIDED  
DOUBLE DENSITY WITH  
HUB REINFORCING RINGS

Package of 10: **\$19.00**

**BONUS!**

**FREE!!** KASSETTE 10  
LIBRARY CASE WITH  
PACKAGE OF 10 DISKETTES  
A \$4.25 VALUE!!



KNPRI580 package of 80, less Library Case **\$120.00**

## 64K IEEE-S100 DYNAMIC MEMORY CARD **\$199.00**

KNCCS20653

LIST PRICE: \$350.00

**SAVE \$151.00!!**

- 2 or 4 MHz operation
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- Bank-select system allows system memory expansion
- Bank-select port's address is jumper selectable
- Any 16K block can be made bank-independent
- All 64K can be made bank-enabled on power-on and reset
- Fully buffered address and data lines

**SAVE \$151.00!! WHILE THEY LAST!!**

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### APPLE DISK DRIVES



Give your APPLE II® a Fourth Dimension—the totally compatible 5 1/4" drive that takes your system farther, faster. With read/write electronics so advanced that reading errors are virtually eliminated. With a track zero microswitch that keeps boot and track access smooth and quiet.

#### EXTENDED WARRANTY

Fourth Dimension offers a 12 month parts and labor warranty at no cost to you! (See, this really looks GOOD!)

KNFDS40A List Price: \$349.00 **SALE: \$289.00**

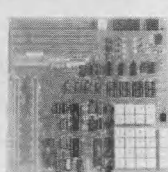
KNFDS40AC\* Apple II® Disk Drive Controller **\$115.00**

\*Sold only with the purchase of Fourth Dimension Drive



## Z-80 BEGINNER KIT Z80 CPU - 2 S-100 EXPANSION SLOTS

- Z80 CPU
- 2 S-100 slots for expansion
- Wire wrap area for custom circuitry
- On board keyboard and display
- Cassette interface for mass storage
- 2K RAM included
- 4K ROM (not included)
- RS232 port 300-19.2K baud
- Comes with ZBUG Monitor on ROM with SIO driver routines
- TINY BASIC available



KNQTCZ80BEGA

LIST PRICE: \$400.00

**SALE PRICE:**

**\$340.00**

(Shipping weight 4 lbs)

TINY BASIC ROM:  
KNQTCBTASIC **\$25.00**

## EIA/RS232 WALL PLATES

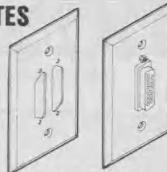
(Does not include connectors)

KNIIWP08251 Single punched

**4/\$10.00**

KNIIWP08252 Dual Punched

**4/\$12.00**



## RS-232 "D" SUB-MINIATURE CONNECTORS

1-9 10-24 25-99

KNCNDB25P 25 Pin Male **\$3.00 \$2.75 \$2.25**

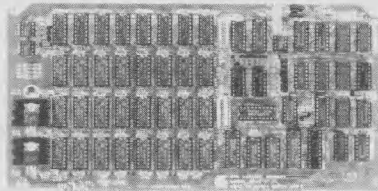
KNCNDB25S 25 Pin Female **\$4.00 \$3.75 \$3.00**

KNCNDB51212 2 Pc. Grey Hood **\$1.60 \$1.45 \$1.30**

KNCNDB25H 2 Pc. Grey Hood **\$1.50 \$1.25 \$1.10**

KNCNDB51226 2 Pc. Black Hood **\$1.90 \$1.65 \$1.45**

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- Configuration as a 16K, 32K, or 48K board without the removal of RAMs
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- Board configuration with reliable easy-to-configure Berg jumpers
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- Jumper-selectable Phantom i put
- Uses Popular 4116 RAMs
- Assembled & Tested
- All ICs in sockets
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Before you plug in your computer, you'd better consider how you are going to insure or protect your investment from unwanted electrical pollution.

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Part No.	Description	Wt.	List	SALE
KNWBRDG115P	Wall unit plug in	2 lbs.	\$49.95	<b>\$34.95</b>
KNWBRDG115S	6 outlet strip w/SW&LT	3 lbs.	\$61.95	<b>\$42.00</b>

### DG315 SERIES

#### 3 STAGE SPIKE FILTER AND FOUR STAGE NOISE FILTER

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KNWBRDG315S	6 outlet strip w/SW&LT	3 lbs.	\$193.95	<b>\$119.95</b>
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## TEXAS INSTRUMENTS 16 PIN GOLD AND TIN DIP SOLDER TAIL SOCKETS

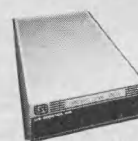
	TIN	GOLD
QTY	KNTIS16LP	KNTIG16LP
50	<b>\$ 8.00</b>	<b>\$ 10.00</b>
1000	<b>\$ 60.00</b>	<b>\$ 80.00</b>
4500	<b>\$225.00</b>	<b>\$315.00</b>

## U.S. ROBOTICS

## AUTO DIAL 212A MODEM **\$495.00**

The **AUTO DIAL 212A** Modem is a direct connect 0-300 or 1200 baud modem capable of dialing and calling for you. The **AUTO DIAL 212A** is compatible in function to the DC Hayes **SMARTMODEM™**.

Part No.	Description	List	SALE Price
KNUSRADIAL212A	0-300, 1200 baud dialing modem	\$599.00	<b>\$495.00</b>



### ACOUSTIC MODEM

The **PHONE LINK** Modem is a 300 baud RS232 compatible acoustic modem capable of operating as either an answer or originate modem. It is BELL 103/113 compatible and will accept most standard phone handsets.

KNUSRPLNK	0-300 Baud acoustic modem	\$149.00	<b>\$129.00</b>
-----------	---------------------------	----------	-----------------

### MICRO LINK DIRECT CONNECT MODEMS

The **MICRO LINK** Modems are available in either 0-300 or 1200 baud transmission rates and both are RS232 compatible. Operation can be answer or originate.

KNUSRLNK300	0-300 baud direct connect	\$179.00	<b>\$159.00</b>
KNUSRLNK1200	1200 baud direct connect	\$499.00	<b>\$399.00</b>

### AUTO LINK DIRECT CONNECT AUTO ANSWER MODEMS

The **AUTO LINK** Modems are auto answer modems capable of operating at 0-300 baud or 1200 baud transmission rates. The **AUTO LINK** Modems can be operated in either answer or originate modes.

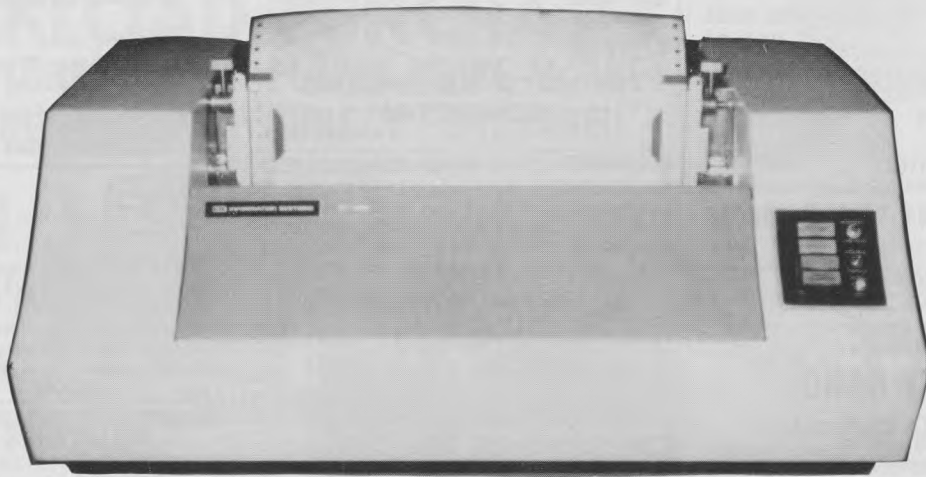
K USRLNK300	0-300 baud auto/direct connect	\$219.00	<b>\$195.00</b>
KNUSRLNK1200	1200 baud auto/direct connect	\$499.00	<b>\$449.00</b>
KNUSRLNK212A	0-300, 1200 baud auto/direct	\$549.00	<b>\$475.00</b>

Specs	USRA01AL212A	USRLNK212A	USRLNK1200	USRLNK300	USRLNK300	USRLNK
1200 Baud	X	X	X	X		
0-300 Baud		X	X		X	X
Auto Dial	X					
(Hayes Smartmodem compatible)						
Auto Answer	X	X	X	X		
Auto Mode Select	X				X	X
DTX Override	X	X	X	X	X	X
RS232 pins 2&3 reversible	X	X	X	X	X	X
LED Indicators:						
Carrier Detect	X	X	X	X	X	X
Analog Loopback/ Self Test	X	X	X	X	X	X
Send Data	X	X	X	X	X	X
Receive Data	X	X	X	X	X	X
Terminal Ready	X	X	X	X	X	X
Off Hook	X	X	X	X	X	X
Answer Mode	X	X	X	X	X	X
Ring Indicate	X	X	X	X	X	X
High Speed	X	X				





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- 5 x 7 Dot Matrix
- 164 C.P.S.
- Centronics parallel interface
- Adjustable tactor feed to 15" paper
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- \$225.00 f.o.b. our warehouse

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101A's complete & untested—some need repair—"As is"  
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Zenith ZT-100	\$595.00
Televideo 910+	\$595.00
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16K Ram Kit for Apple II, TRS80	
200 nano seconds; 4116 chips	\$17.50

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Maxell 8" single side	\$49.00
Maxell 5 1/4" double side	\$45.00
Maxell 8" double side	\$55.00
BASF 5 1/4"	\$26.95
BASF 8"	\$36.00
Verbatim 5 1/4"	\$26.95
Verbatim 8"	\$36.00
5 1/4 File Box	\$19.95

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Novation D-CAT	\$155.00
Novation AUTO-CAT	\$209.00
Novation APPLE CAT	\$319.00
Hayes Smart Modem	\$249.00
Hayes Smart Modem 1200	\$589.00
Hayes Micro-Modem	\$319.00
Hayes Chronograph	\$229.00
Signalman Mark I	\$85.00

## COMPUTERS

Sanyo MBC 100 64K	CALL
Call for information on the complete Sanyo line.	
Sanyo MBC 1200	CALL
Sanyo MBC 2000	CALL
Sanyo MBC 3000	CALL
Sanyo MBC 4000	CALL
Franklin Ace 1000	CALL
ZENITH	
Z-89 48K	CALL
Z-90 64K	CALL
Z-100	CALL
Call for prices on the complete Zenith line.	

## SOFTWARE

MICROPRO™	
WordStar	\$379.00
MailMerge	\$195.00
Customization Notes	\$359.00
SpellStar	\$195.00
DataStar	\$259.00
CalcStar	\$119.00
MICROSOFT	
Basic Interpreter	\$349.00
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Fortran 80	\$499.00
Cobol 80	\$695.00
DATA BASE	
dBase II	\$495.00

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Apple terminals, without disk drives!  
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Videoterm by Videx	\$259.00
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Add-Ram 16K Card	\$79.00
Z-Card CP/M for the Apple II	\$225.00
Smarterm 80 Column Board w/Softswitch	\$249.00

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NEC 7720 KSR	\$2749.00
NEC 7730 Parallel	\$2395.00
NEC 3510 Serial	\$1850.00
NEC 3520	\$2099.00
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NEC 3550 for the IBM PC	\$2095.00
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Epson MX-80FT	CALL
Epson MX-100	CALL
IDS Micro Prism	CALL
IDS PRISM 80	CALL
IDS PRISM 132	CALL
Okidata Microline 80	CALL
Okidata Microline 82A	CALL
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## MONITORS

Sanyo 9" B&W	\$159.00
Sanyo 9" Green	\$165.00
Sanyo 12" B&W	\$179.00
Sanyo 12" Green	\$199.00
Sanyo 13" Color	\$399.00
SMD 13" Color	\$329.00
Zenith 12" Green	\$99.00
Zenith 13" Color	\$339.00
Electrohome 13" Hi-RES Color Monitor	\$829.00
Electrohome 13" Color	\$379.00
Electrohome 12" B&W	\$179.00
Electrohome 12" Green	\$189.00
Electrohome 9" B&W	\$149.00
Electrohome 9" Green	\$159.00

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5 1/4" 40 track	\$299.00
CCI 189 for the Zenith Z-89 5 1/4" 40 track	\$379.00
CORVUS 5M with Mirror	\$2895.00
CORVUS 10M with Mirror	\$4195.00
CORVUS 20M with Mirror	\$4895.00
CORVUS Interfaces	CALL
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Elite Two 80 Track	CALL
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### 16K RAM CARD - for Apple II

Expand your Apple II to 64K, use as language card, full 1 year warranty. Why spend \$175.00 ?

MEX-16700A Save over \$115.00 ..... \$59.95

### Z-CARD for Apple II - A.L.S.

Two computers in one, Z-80 & 6502, more than doubles the power and potential of your Apple, includes Z-80 CPU card CP/M 2.2 and complete manual set, Pascal compatible, utilities are menu-driven, one year warranty.

CPX-62800A A & T with CP/M 2.2 ..... \$169.95

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80 column x 24 line video card for Apple II, addressable 25th status line, normal/inverse or high/low video, 128 ASCII characters, upper and lower case, 7 x 9 dot matrix with true descenders, standard data media terminal control codes, CP/M Pascal & Fortran compatible, 50/60 Hz, 40/80 column selection from keyboard

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Full feature serial card for modems & printers, baud rates from 110 to 19,200, CTC/RTS & X-on/X-off protocols, auto line feed, RS-232C cable interface included.

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Two asynchronous serial RS-232C I/O ports, real time clock-calendar, includes software

IOI-8100A Card with 1 port ..... \$159.95  
IOI-8101A Card with 2 ports ..... \$199.95

### SERIAL/PARALLEL for IBM PC - Profit Sys

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IOI-8111A 2 serial & 1 parallel ..... \$229.95

### TASC MASTER for IBM PC - Profit Systems

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IOI-8121A 1 serial/parallel/64K ..... \$399.95  
IOI-8122A 2 serial/parallel/16K ..... \$359.95  
IOI-8123A 2 serial/parallel/64K ..... \$429.95

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TSX-300A IBM PC extender ..... \$45.00

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MEX-51200A 512K Assembled & tested ..... \$999.95  
MEX-25600S MDRIVE disk emulator ..... \$25.00

### 256K PC/RAM - Hammond Engineering

User expandable from 64K to 256K, same high quality as RAM STACK above, designed to meet all your medium memory expansion requirements

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MEX-128000A 128K Assembled & tested ..... \$399.95  
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MEX-256000A 256K Assembled & tested ..... \$569.95

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15 MHz bandwidth 700 lines/inch, P31 green phosphor, switchable 40 or 80 columns, small, light-weight & portable.

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VDM-651260 Economy 12" ..... \$149.95  
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VDA-821200 RGB card for Apple II ..... \$99.95

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VDC-801320 13" Color II ..... \$894.95  
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Single board, standard size S-100 computer system, 4 MHz Z-80A, single or double density disk controller for 5 1/4" or 8" drives, 64K RAM, extended addressing, up to 4K of EPROM, 2 serial & 2 parallel I/O ports, real time interrupt clock, CP/M compatible.

CPC-30800A A & T ..... \$724.95  
IOX-4232A Serial I/O adapter ..... \$29.95

### Z-80 STARTER KIT - SD Systems

Complete Z-80 microcomputer with RAM, ROM, I/O, keyboard, display, kludge area, manual, & workbook.

CPS-30100K Kit with workbook ..... \$299.95  
CPS-30100A A & T with workbook ..... \$469.95

## S-100 EPROM Boards

### PB-1 - SSM Microcomputer

2708, 2716 EPROM board with on-board programmer.

MEM-99510K Kit with manual ..... \$154.95  
MEM-99510A A & T with manual ..... \$219.95

### PROM-100 - SD Systems

2708, 2716, 2732 EPROM programmer with software.

MEM-99520K Kit with software ..... \$189.95  
MEM-99520A A & T with software ..... \$249.95

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### ISO-BUS - Jade

Silent, simple, and on sale - a better motherboard

6 Slot (5 1/4" x 8 1/2")

MBS-061B Bare board ..... \$22.95  
MBS-061K Kit ..... \$39.95  
MBS-061A A & T ..... \$69.95

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MBS-121B Bare board ..... \$34.95  
MBS-121K Kit ..... \$69.95  
MBS-121A A & T ..... \$109.95

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MBS-181K Kit ..... \$99.95  
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CP/M 3.0 is Digital Research's latest version of the industry standard disk operating system. It features many performance improvements such as intelligent record buffering, improved directory handling, "HELP" facility, time/date stamping of files and many more improvements. AND A TREMENDOUS INCREASE IN SPEED !!!, it is fully CP/M 2.2 compatible and requires no changes to your existing application software. Available only to Versafloppy II owners with SBC-200 CPU's

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- Supports up to 16 drives of 512 Megabytes each
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- Console I/O re-direction
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- Power batch facility
- Designed for application programmers
- Resident system extensions
- Sophisticated programmer utilities
- Designed with the business user in mind

SFC-55009057F CP/M 3.0 8" with manuals ..... \$200.00  
SFC-55009057D CP/M 3.0 manual set ..... \$30.00

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### 256K RAMDISK - SD Systems

ExpandoRAM III expandable from 64K to 256K using 64K x 1 RAM chips, compatible with CP/M, MP/M, Oasis, Cromemco, & most other Z-80 based systems, functions as ultra-high speed disk drive when used with optional RAMDISK software.

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MEM-65128A 128K A & T ..... \$574.95  
MEM-65192A 192K A & T ..... \$674.95  
MEM-65256A 256K A & T ..... \$774.95  
SFC-55009000F RAMDISK sftwr CP/M 2.2 ..... \$44.95  
SFC-55009000F RAMDISK with EXRAM III ..... \$24.95

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Uses new 2K x 8 static RAMs, fully supports IEEE 696 24 bit extended addressing, 200ns RAMs, lower 32K or entire board phantomable, 2716 EPROMs may be subbed for RAMs, any 2K segment of upper 8K may be disabled, low power typically less than 500ma.

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MEM-99152K Kit less RAM ..... \$99.95  
MEM-32152K 32K kit ..... \$199.95  
MEM-56152K 56K kit ..... \$289.95  
MEM-64152K 64K kit ..... \$299.95  
Assembled & Tested ..... add \$50.00

### 16K STATIC RAM - Mem Merchant

4MHz lo-power static RAM board, IEEE S-100, bank selectable, addressable in 4K blocks, disable-able in 1K segments extended addressing.

MEM-16171A 16K A & T ..... \$149.95

## S-100 Disk Controllers

### DISK 1 - CompuPro

8" or 5 1/4" DMA disk controller, single or double density, single or double sided, 10 MHz.

IOD-1810A A & T ..... \$449.95  
IOD-1810C CSC ..... \$554.95

### VERSAFLOPPY II - SD Systems

Double density disk controller for any combination of 5 1/4" and 8" single or double sided, analog phase-locked loop data separator, vectored interrupts, CP/M 2.2 & Oasis compatible, control/diagnostic software PROM included.

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SFC-55009047F CP/M 3.0 with VF II ..... \$99.95

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5 1/4" or 8" double density disk controller with on-board boot loader ROM, free CP/M 2.2 & manual set.

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High reliability double density disk controller with on-board Z-80A, auxiliary printer port, IEEE S-100, can function in multi-user interrupt driven bus.

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IOD-1200K Kit w/hdw & sftwr man ..... \$299.95  
IOD-1200A A & T w/hdw & sftwr man ..... \$325.95  
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# New CP/M Plus Version 3.0 FREE !!! \*

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S-100 board set with 4 MHz Z-80A, 64K of RAM expandable to 256K, serial and parallel I/O ports, double-density disk controller for 5 1/4" and 8" disk drives, new and improved CP/M 3.0 manual set, system monitor, control and diagnostic software. Includes SD Systems SBC-200, 64K ExpandoRAM III, Versafloppy II, and FREE CP/M 3.0 - all boards are assembled & tested.

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256K Board Set with FREE CP/M 3.0 ..... \$1395.00

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FREE CP/M 2.2 Save \$700.00  
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SPECIAL PACKAGE PRICE Save over \$700.00 .. \$694.95

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2 serial I/O ports plus 2 parallel I/O ports.

IOI-1010B Bare board w/manual ..... \$35.00  
IOI-1010K Kit with manual ..... \$179.95  
IOI-1010A A & T with manual ..... \$249.95

### I/O-5 - SSM Microcomputer

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IOI-1015A A & T ..... \$289.95

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3 serial, 1 parallel, 1 Centronics parallel.

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Whether you're a hobbyist with a cantankerous kluge or a field technician with an anxious computer owner breathing down your neck, you'll find **THE BUS PROBE** speeds your repair time remarkably. Just plug in **THE BUS PROBE** and you'll be able to see all the IEEE S-100 signals in action. **THE BUS PROBE** allows you to see inputs, outputs, memory reads and writes, instruction fetches, DMA channels, vectored interrupts, 8 or 16 bit wide data transfers, plus the three bus supply voltages.

TSX-200B Bare board ..... \$59.95  
TSX-200K Kit ..... \$129.95  
TSX-200A A&T ..... \$159.95

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4 MHz Z-80A CPU with serial & parallel I/O, 1K RAM, 8K ROM space, monitor PROM included.

CPC-30200A A & T ..... \$329.95

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CPU-30201B Bare board w/manual ..... \$35.00  
CPU-30201K Kit with manual ..... \$149.95  
CPU-30210A A & T with manual ..... \$199.95

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2 or 4 MHz Z-80 CPU with serial I/O port & on-board monitor PROM, front panel compatible.

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**JADE** Computer Products



# 8" Disk Drive Double-Density \$249.95

## 8" Disk Drives

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<b>Shugart SA810</b> half-size single-sided double-density	
MSF-108100	\$424.95 ea 2 for \$394.95 ea
<b>Shugart SA860</b> half-size double-sided double-density	
MSF-108600	\$574.95 ea 2 for \$549.95 ea
<b>Shugart SA801R</b> single-sided double-density	
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<b>Shugart SA851R</b> double-sided double-density	
MSF-10851R	\$554.95 ea 2 for \$529.95 ea
<b>Tandon TM848-1</b> single-sided double-den thin-line	
MSF-558481	\$379.95 ea 2 for \$369.95 ea
<b>Tandon TM848-2</b> double-sided double-den thin-line	
MSF-558482	\$494.95 ea 2 for \$484.95 ea
<b>Qume DT-8</b> double-sided double-density	
MSF-750080	\$524.95 ea 2 for \$498.95 ea

## 5 1/4" Disk Drives

<b>Tandon TM100-1</b> single-sided double-density 48 TPI	
MSM-551001	\$219.95 ea 2 for \$199.95 ea
<b>Shugart SA400L</b> single-sided double-density 40 track	
MSM-104000	\$234.95 ea 2 for \$224.95 ea
<b>Shugart SA455</b> half-size double-sided 48 TPI	
MSM-104550	\$349.95 ea 2 for \$329.95 ea
<b>Shugart SA465</b> half-size double-sided 96 TPI	
MSM-104650	\$399.95 ea 2 for \$379.95 ea
<b>Tandon TM100-2</b> double-sided double-density 48 TPI	
MSM-551002	\$294.95 ea 2 for \$269.95 ea
<b>Shugart SA450</b> double-sided double-density 35 track	
MSM-104500	\$349.95 ea 2 for \$329.95 ea
<b>Tandon TM100-3</b> single-sided double-density 96 TPI	
MSM-551003	\$294.95 ea 2 for \$269.95 ea
<b>Tandon TM100-4</b> double-sided double-density 96 TPI	
MSM-551004	\$394.95 ea 2 for \$374.95 ea
<b>MPI B-51</b> single-sided double-density 40 track	
MSM-155100	\$234.95 ea 2 for \$224.95 ea
<b>MPI B-52</b> double-sided double-density 40 track	
MSM-155200	\$344.95 ea 2 for \$334.95 ea

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END-000216 Single cab w/power supply	\$69.95
END-000226 Dual cab w/power supply	\$94.95

## Dual Disk Sub-Systems

### Disk Sub-Systems - Jade

Handsome metal cabinet with proportionally balanced air flow system, rugged dual drive power supply, power cable kit, power switch, line cord, fuse holder, cooling fan, never-mar rubber feet, all necessary hardware to mount 2-8" disk drives, power supply, and fan, does not include signal cable.

#### Dual 8" Sub-Assembly Cabinet

END-000420 Bare cabinet	\$49.95
END-000421 Cabinet kit	\$199.95
END-000431 A & T	\$249.95

#### 8" Sub-Systems - Single Sided, Double Density

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END-000424 A & T w/2 FD100-8Ds	\$695.00
END-000433 Kit w/2 SA-801Rs	\$999.95
END-000434 A & T w/2 SA-801Rs	\$1195.00

#### 8" Sub-Systems - Double Sided, Double Density

END-000426 Kit w/2 DT-8s	\$1224.95
END-000427 A & T w/2 DT-8s	\$1424.95
END-000436 Kit w/2 SA-851Rs	\$1274.95
END-000437 A & T w/2 SA-851Rs	\$1474.95

## 8" Slimline Sub-Systems

### Dual Slimline Sub-Systems - Jade

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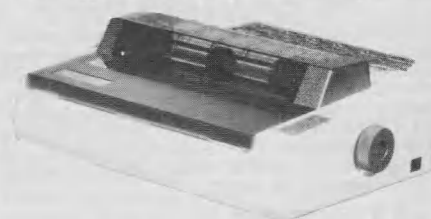
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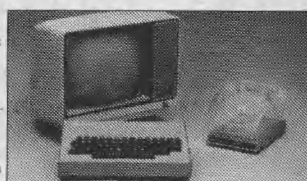
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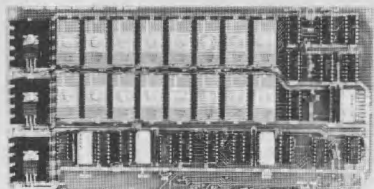
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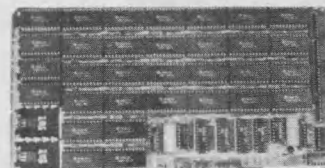
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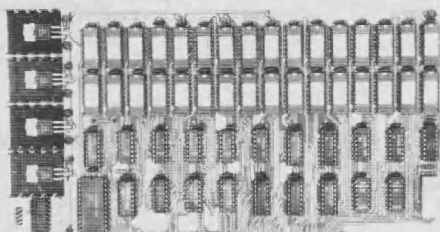
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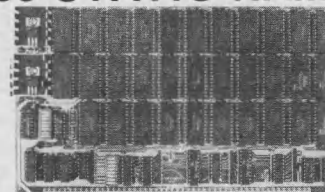
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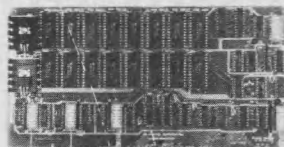
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- \* 200 NS (FAST!) RAM's are standard on the RAM Kit
- \* Supports both Cromemco and North Star Bank Select
- \* Supports Phantom
- \* On Board wait State Generator
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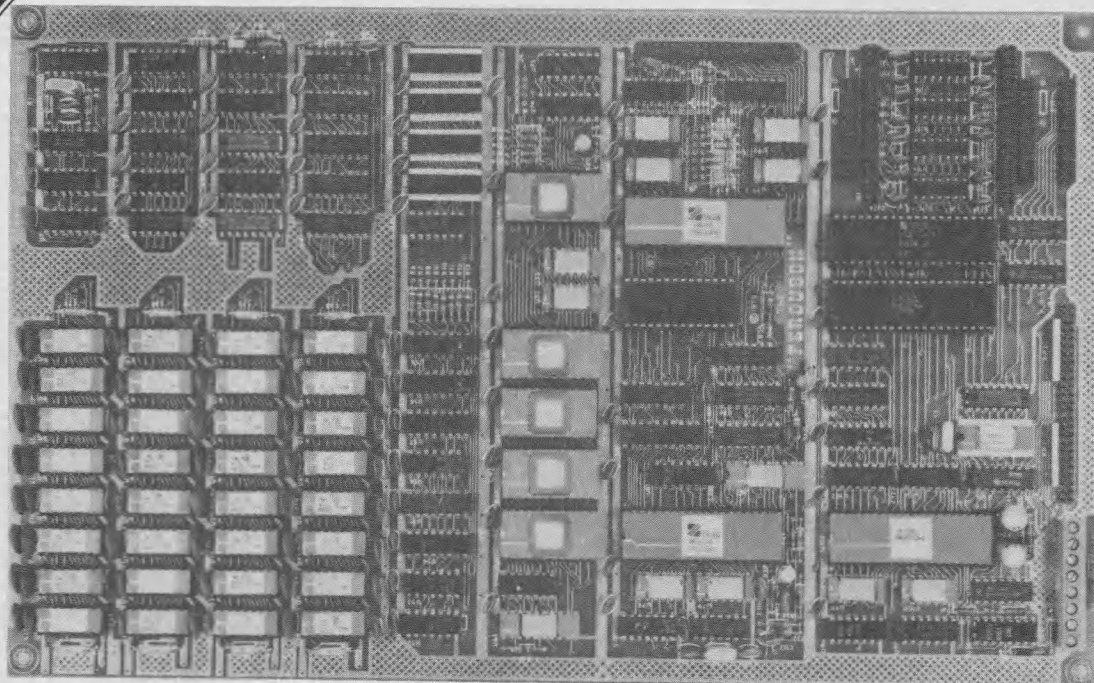
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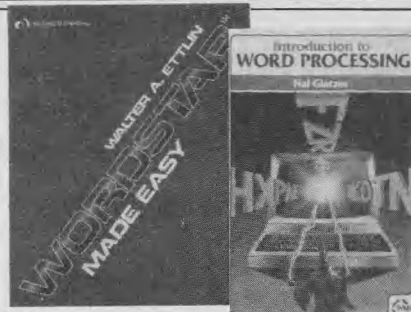
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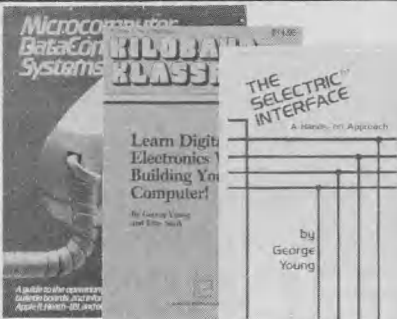




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A New Technique for Neophytes

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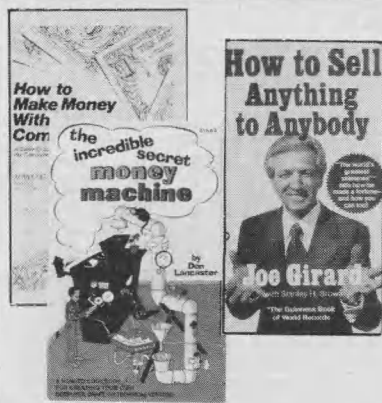
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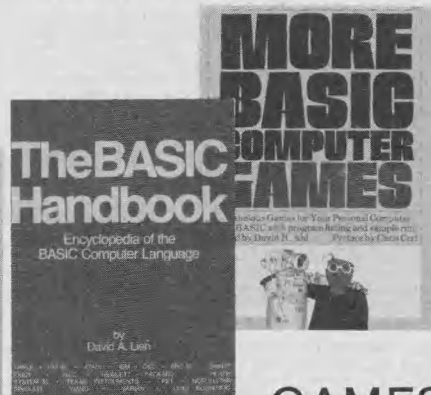
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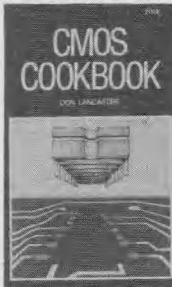
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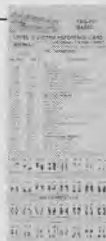
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# CONVERSIONS

Conversion of the check writing program published in the December 1982 issue (p. 92) for the Apple II. By Dian L. Sprang (c/o Microcomputing).

```

230 GOSUB 410
240 INPUT "AMOUNT OF CHECK: ";AMOUNT$
290 GOSUB 590
320 PRINT CHECK$
330 PRINT
340 IF AMOUNT$ < > "" THEN GOTO 260
370 STOP
410 REM
420 DIM UNIT$(19): DIM TENS$(9): DIM MULT$(5)
430 FOR I = 1 TO 19
440 READ UNIT$(I)
450 NEXT I
460 FOR I = 2 TO 9
470 READ TENS$(I)
480 NEXT I
490 FOR I = 2 TO 5
500 READ MULT$(I)
510 NEXT I
520 DATA "ONE","TWO","THREE","FOUR","FIVE","SIX","SEVEN","EIGHT","NINE",
"TEN","ELEVEN"
530 DATA "TWELVE","THIRTEEN","FOURTEEN","FIFTEEN","SIXTEEN","SEVENTEEN",
"EIGHTEEN"
540 DATA "NINETEEN","TWENTY","THIRTY","FORTY","FIFTY","SIXTY","SEVENTY",
"EIGHTY"
550 DATA "NINETY","THOUSAND","MILLION","BILLION","TRILLION"
560 RETURN
590 REM
600 CHECK$ = "": DOLLAR$ = "": CENTS$ = ""
630 IF VAL (AMOUNT$) < .01 THEN CHECK$ = "***VOID***": RETURN
690 DECP = 0: NUMCHAR = LEN (AMOUNT$)
700 FOR INDEX = 1 TO NUMCHAR
710 IF MID$(AMOUNT$,INDEX,1) = "." THEN DECP = INDEX
720 NEXT INDEX
750 IF DECP = 0 THEN DOLLAR$ = AMOUNT$
760 IF (DECP < > 0 AND DECP > 1) THEN DOLLAR$ = LEFT$(AMOUNT$,DECP
- 1)
770 IF DECP > 0 THEN CENTS$ = MID$(AMOUNT$,DECP + 1,2)
780 IF VAL (CENTS$) = 0 THEN CENTS$ = "": AMOUNT$ = DOLLAR$
840 IF LEN (CENTS$) = 1 THEN CENTS$ = CENTS$ + "0"
870 DEF FN MOD(A) = INT (A / 3 - INT (A / 3)) * 3 + .5) * SGN (A / 3
)
900 IF FN MOD(LEN (DOLLAR$)) > 0 THEN FOR INDEX = 1 TO 3 - FN MOD(LEN
(DOLLAR$)): DOLLAR$ = "0" + DOLLAR$: NEXT INDEX
960 FOR I = LEN (DOLLAR$) / 3 TO 1 STEP - 1
990 D1 = VAL (LEFT$(DOLLAR$,1))
1000 D2 = VAL (MID$(DOLLAR$,2,1))
1010 D3 = VAL (MID$(DOLLAR$,3,1))
1020 IF D1 > 0 THEN CHECK$ = CHECK$ + UNIT$(D1) + " HUNDRED "
1030 IF D2 = 0 THEN CHECK$ = CHECK$ + UNIT$(D3) + " "
1040 IF D2 = 1 THEN CHECK$ = CHECK$ + UNIT$(D2 * 10 + D3) + " "
1050 IF D2 > 1 THEN CHECK$ = CHECK$ + TENS$(D2): IF D3 > 0 THEN CHECK$ =
CHECK$ + "-" + UNIT$(D3) + " "
1060 IF (D2 > 1 AND D3 < 0) THEN CHECK$ = CHECK$ + " "
1070 IF I > 1 THEN DOLLAR$ = MID$(DOLLAR$,4): IF D1 + D2 + D3 > 0 THEN
CHECK$ = CHECK$ + MULT$(I) + " "
1080 NEXT I
1130 IF CHECK$ = " " THEN CHECK$ = ""
1140 IF CHECK$ = "" THEN CHECK$ = "NONE"
1150 IF CENTS$ = "" THEN CHECK$ = "EXACTLY " + CHECK$: IF VAL (AMOUNT$) =
1 THEN CHECK$ = CHECK$ + "DOLLAR"
1170 IF CENTS$ < > "" THEN CHECK$ = CHECK$ + " AND " + CENTS$ + "/100 DO
LLARS"
1190 FOR INDEX = 1 TO LEN (CHECK$)
1200 IF (MID$(CHECK$,INDEX,2) = " " AND INDEX > 1) THEN CHECK$ = LEFT$(
CHECK$,INDEX - 1) + MID$(CHECK$,INDEX + 1)
1210 IF (MID$(CHECK$,INDEX,2) = " " AND INDEX < 1) THEN CHECK$ = MID$(
CHECK$,INDEX + 2)
1220 NEXT INDEX
1230 RETURN
1240 END

```

Check writing program converted for the IBM microcomputer by Bruce Lutz (404 Arborcrest Dr., Richardson, TX 75080).

```

450 '*****
* CHECK WRITING PROGRAM
* MICROCOMPUTING DEC 1982
460 '
* BY VAN WOLVERTON
* CONVERTED FOR IBM PC
* BY BRUCE C. LUTZ
470 '
500 '*****
* INITIALIZE WORD ARRAYS
*****
510 DIM UNIT$(19)
520 FOR I = 1 TO 19
530 READ UNIT$(I)
540 NEXT I
550 FOR I = 2 TO 9
560 READ TENS$(I)
570 NEXT I
580 FOR I = 2 TO 5
590 READ MULT$(I)
600 NEXT I
610 DATA one,two,three,four,five,six,seven,eight,nine,ten,eleven,twelve,
thirteen,fourteen,fifteen,sixteen,seventeen,eighteen,nineteen
620 DATA twenty,thirty,forty,fifty,sixty,seventy,eighty,ninety
630 DATA thousand,million,billion,trillion
640 REM RETURN
1000 '*****
* INITIALIZE STRINGS AND VERIFY INPUT
*****
1010 CHECK$ = "":
DOLLAR$ = "":
CENTS$ = ""
1020 IF VAL(AMOUNT$) < .01 THEN
CHECK$ = "*** VOID ***":
RETURN
2000 '*****
* SEPARATE INTO DOLLAR AND CENT STRINGS
*****
2010 DECP = INSTR(AMOUNT$,".")

```

Listing continued.

```

2012 IF DECP = 0 THEN DOLLAR$ = AMOUNT$
ELSE DOLLAR$ = LEFT$(AMOUNT$,DECP-1):
CENTS$ = MID$(AMOUNT$,DECP+1,2)
2020 IF VAL(CENTS$) = 0 THEN CENTS$ = "":
AMOUNT$ = DOLLAR$
3000 '*****
* CONDITION INPUT DATA
*****
3010 IF LEN(CENTS$) = 1 THEN CENTS$ = CENTS$ + "0"
3020 IF LEN(DOLLAR$) MOD 3 > 0
THEN DOLLAR$ = STRING$(3-LEN(DOLLAR$) MOD 3,"0") + DOLLAR$
4000 '*****
* CONVERT DOLLAR STRING TO WORDS
*****
4010 FOR I = LEN(DOLLAR$) / 3 TO 1 STEP -1
4020 DIGIT1 = VAL(LEFT$(DOLLAR$,1))
4030 DIGIT2 = VAL(MID$(DOLLAR$,2,1))
4040 DIGIT3 = VAL(MID$(DOLLAR$,3,1))
4050 IF DIGIT1 > 0 THEN CHECK$ = CHECK$ + UNIT$(DIGIT1) + " hundred "
4060 IF DIGIT2 = 0 THEN CHECK$ = CHECK$ + UNIT$(DIGIT3) + " "
4070 IF DIGIT2 = 1 THEN CHECK$ = CHECK$ + UNIT$(DIGIT2 * 10 + DIGIT3) + " "
4080 IF DIGIT2 > 1 THEN CHECK$ = CHECK$ + TENS$(DIGIT2):
IF DIGIT3 > 0 THEN CHECK$ = CHECK$ + "-" + UNIT$(DIGIT3) + " "
ELSE CHECK$ = CHECK$ + " "
4090 IF I > 1 THEN DOLLAR$ = MID$(DOLLAR$,4):
IF DIGIT1 + DIGIT2 + DIGIT3 > 0 THEN CHECK$ = CHECK$ + MULT$(I) + " "
4100 NEXT I
5000 '*****
* ADD CENTS AND CLEAN UP
*****
5010 IF CHECK$ = "" THEN CHECK$ = "NONE"
5020 IF CENTS$ < > "" THEN CHECK$ = CHECK$ + " and " + CENTS$ + "/100 dollars":
GOTO 5030
5025 CHECK$ = "EXACTLY " + CHECK$
5027 IF VAL(AMOUNT$) = 1 THEN CHECK$ = CHECK$ + " dollar"
ELSE CHECK$ = CHECK$ + " dollars":
5030 MID$(CHECK$,1,1) = CHR$(ASC(MID$(CHECK$,1,1))-32)
5042 DBLANK = INSTR(CHECK$," ")
5045 WHILE INSTR(CHECK$," ")
5046 CHECK$ = LEFT$(CHECK$,DBLANK) + MID$(CHECK$,DBLANK+2)
5047 DBLANK = INSTR(CHECK$," ")
5049 WEND
5050 RETURN

```

Check writing conversion program for the Atari microcomputer by Philip Kreiker (PO Box 5084, Loveland, CO 80537).

```

400 REM *****
405 REM *
410 REM * These routines translate a numeric string to its corresponding
420 REM * English string for check printing purposes.
430 REM *
440 REM * Written by Van Wolverton in Microsoft Basic
450 REM *
460 REM * Translated to ATARI BASIC by Philip M. Kreiker
470 REM *****
500 REM *****
510 REM * Initialize Word Arrays
520 REM *****
530 DIM AMOUNT$(18), UNIT$(9), TENS$(7), MULT$(8), CHECK$(255), DOLLAR$(15)
540 RETURN
550 REM
600 DATA one,two,three,four,five,six,seven,eight,nine,ten,eleven
610 DATA twelve,thirteen,fourteen,fifteen,sixteen,seventeen,eighteen,nineteen
620 REM
630 DATA twenty,thirty,forty,fifty,sixty,seventy,eighty,ninety
640 REM
650 DATA thousand,million,billion,trillion
700 REM GET UNIT$(D)
710 RESTORE 600:
FOR J=1 TO D:
READ UNIT$:
NEXT J
720 CHECK$(LEN(CHECK$)+1)=UNIT$
730 CHECK$(LEN(CHECK$)+1)=" "
740 RETURN
800 REM GET TENS$(D)
810 RESTORE 630:
FOR J=2 TO D:
READ TENS$:
NEXT J
820 CHECK$(LEN(CHECK$)+1)=TENS$
840 RETURN
900 REM GET MULT$(I)
910 RESTORE 650:
FOR J=2 TO I:
READ MULT$:
NEXT J
920 CHECK$(LEN(CHECK$)+1)=MULT$
930 CHECK$(LEN(CHECK$)+1)=" "
940 RETURN
1000 REM *****
1010 REM * Initialize Strings and Verify Input
*****
1020 REM *****
1030 CHECK$ = "":
DOLLAR$ = "":
CENTS$ = ""
1040 TRAP 1100
1050 IF VAL(AMOUNT$) >= 0.01 THEN TRAP 32768:
GOTO 2000
1060 REM
1100 CHECK$ = "*** VOID ***"
1110 RETURN
2000 REM *****
2010 REM * Separate into Dollar and Cents Amounts
*****
2020 REM *****
2030 FOR I=1 TO LEN(AMOUNT$)
2040 IF AMOUNT$(I,1) = "." THEN DECP=I:
FOR J=1
GOTO 2100
2050 NEXT I
2060 DECP=0
2100 IF DECP=0 THEN DOLLAR$=AMOUNT$
2110 IF DECP>1 THEN DOLLAR$=AMOUNT$(1,DECP-1)
2115 IF DECP=1 AND DECP<LEN(AMOUNT$) THEN CENTS$=AMOUNT$(DECP+1)
2120 IF CENTS$="" THEN CENTS$="0"
3000 REM *****
3010 REM * Condition Input Data
*****
3020 REM *****
3030 IF LEN(CENTS$)=1 THEN CENTS$(2)="0"
3035 REM Pad DOLLAR$ with 0's such that LEN(DOLLAR$) is divisible by 3
3036 REM
3040 MOD3=LEN(DOLLAR$)-INT(LEN(DOLLAR$)/3)*3
3045 START=1+(MOD3=0)+2*(MOD3=2)+3*(MOD3=1)
3050 TEMP$=""
3060 TEMP$(START)=DOLLAR$
3070 DOLLAR$=TEMP$
3090 REM
4000 REM *****
4010 REM * Convert Dollar String to words
*****
4020 REM *****

```



# DISCOUNT



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## Listing continued.

```

4025 IF DOLLARS$="" THEN 5000
4030 FOR I=LEN(DOLLARS$)/3 TO 1 STEP -1
4040 DIGIT1=ASC(DOLLARS$(I))-ASC("0")
4050 DIGIT2=ASC(DOLLARS$(2))-ASC("0")
4060 DIGIT3=ASC(DOLLARS$(3))-ASC("0")
4070 IF DIGIT1>0 THEN D=DIGIT1:
GOSUB 700:
CHECK$(LEN(CHECK$)+1)="hundred "
4080 IF DIGIT2>0 AND DIGIT3>0 THEN D=DIGIT3:
GOSUB 700
4090 IF DIGIT2=1 THEN D=DIGIT2*10+DIGIT3:
GOSUB 700
4100 IF DIGIT2=1 THEN D=DIGIT2:
GOSUB 800
4110 IF DIGIT2=1 AND DIGIT3>0 THEN CHECK$(LEN(CHECK$)+1)="-":
D=DIGIT3:
GOSUB 700
4120 IF DIGIT2=1 AND DIGIT3=0 THEN CHECK$(LEN(CHECK$)+1)="-"
4200 IF I>1 THEN IF DOLLARS$(1,3)<>"000" THEN GOSUB 900
4210 IF I>1 THEN DOLLARS$=DOLLARS$(4)
4220 NEXT I
5000 REM *****
5010 REM * Add Cents and Clean UP *****
5020 REM *****
5030 IF CHECK$="" THEN CHECK$="none "
5040 IF CENTS$="" THEN TEMPS$="EXACTLY ":
TEMPS$(LEN(TEMPS$)+1)=CHECK$:
CHECK$=TEMPS
5050 IF CENTS$="" THEN CHECK$(LEN(CHECK$)+1)="$dollar"
5060 IF CENTS$="" THEN IF VAL(AMOUNT$)<1 THEN CHECK$(LEN(CHECK$)+1)="$s"
5070 IF CENTS$<>" " THEN CHECK$(LEN(CHECK$)+1)="$and "
5080 IF CENTS$<>" " THEN CHECK$(LEN(CHECK$)+1)=CENTS$
5090 IF CENTS$<>" " THEN CHECK$(LEN(CHECK$)+1)="$"/100 dollars"
5100 REM
5110 REM Convert first character to uppercase.
5120 CHECK$(1,1)=CHR$(ASC(CHECK$)-32)
5130 REM
5140 RETURN
  
```

Jose Luis Arriola (1036 Aquamarine Lane, Corona, CA 91720) submitted this Commodore 8032 program translation of the Bookshelf Database program published in the Nov. 1982 issue of Microcomputing (p. 69).

## BOOK DATA BASE

```

10 REM BOOK DATA BASE FILED BY AUTHOR
12 REM BY LINDA M. MCKINNON
13 REM COURTLAND AVE RD#3
14 REM MANCHESTER, NH 03103
15 REM CONVERTED TO CBM 8032
16 REM BY J. L. ARRIOLA
17 CLR:POKE59468,12:FOR#CHR$(13)
19 DIM#(300):REM ACCESSION NUMBER
20 DIM#(300):REM AUTHOR ARRAY
30 DIM#(300):REM TITLE ARRAY
40 DIM#(300):REM PUBLISHER ARRAY
50 DIM#(300):REM YEAR OF PUBLICATION ARRAY
60 DIM#(300):REM ISBN NUMBER
70 DIM#(300):REM LIBRARY CONGRESS NUMBER
80 DIM#(300):REM KEY WORD#1
90 DIM#(300):REM KEY WORD#2
100 DIM#(300):REM KEY WORD#3
110 DIM#(300):REM LEFT NODE ARRAY OF TREE
120 DIM#(300):REM RIGHT NODE ARRAY OF TREE
130 DIM#(300):REM STACK ARRAY
150 PRINT":INPUT ARE YOU CREATING A NEW BOOKSHELF Y(YES) N(YES) IF YES THEN212:
160 OPEN#1:"BOOKSHELF"
161 IFDS(0)THENPRINTDS:STOP
170 INPUT#1,R,J:REM NO. OF RECORDS & LAST ACC NO.
180 FORI=1TOR
185 INPUT#1,N1,I,R#(1),T1(I),PUB(1)
190 INPUT#1,P#(1),I#(1),K#(1),K#(1),K#(1)
192 INPUT#1,I#(1),K#(1),K#(1),K#(1)
194 INPUT#1,L#(1),R#(1)
200 NEXTI
210 CLOSE#1
212 PRINT":
215 %$="BOOKSHELF DATA BASE":PRINT"*****"
217 PRINTTAB(28)-(LEN(%$)/2):PRINT:PRINT
220 PRINTTAB(10):" 1-BOOK INPUT MODE"
230 PRINTTAB(10):" 2-LIST ALL BOOKS"
240 PRINTTAB(10):" 3-DELETE A BOOK"
250 PRINTTAB(10):" 4-EDIT A CITATION"
260 PRINTTAB(10):" 5-SEARCH DATA BASE"
270 PRINTTAB(10):" 6-SAVE BOOKSHELF & CONTINUE"
280 PRINTTAB(10):" 7-QUIT & UPDATE BOOKSHELF"
291 PRINT:PRINT
295 INPUT" ENTER OPTION: ":J
299 IFJ<1ORJ>7THEN295
298 ONJGOSUB400,1000,2000,3000,4000,5000,6000
300 IFJ<7THEN212
310 PRINT":POKE59468,14:END
400 REM BOOK INPUT MODE SUBROUTINE
405 %$=" "
410 PRINT":PRINTTAB(28)-(LEN(%$)/2):%$:PRINT:PRINT
420 R=R+1:J=J+1
430 I=1:REM SEARCH AT ROOT NODE
435 PRINT" ACC # ":J
440 INPUT" AUTHOR: ":R1$:IFLEN(R1$)<1THEN440
450 INPUT" TITLE: ":T1$:IFLEN(T1$)<1THEN450
460 INPUT" PUBLISHER: ":P1$:IFLEN(P1$)<1THEN460
470 INPUT" YEAR: ":Y1$:IFLEN(Y1$)<1THEN470
480 INPUT" ISBN: ":I1$:IFLEN(I1$)<1THEN480
490 INPUT" CAT NO: ":C1$:IFLEN(C1$)<1THEN490
494 INPUT" LC #: ":L1$:IFLEN(L1$)<1THEN494
490 INPUT" KEYWORD1: ":K1$:IFLEN(K1$)<1THEN490
500 INPUT" KEYWORD2: ":K2$:IFLEN(K2$)<1THEN500
510 INPUT" KEYWORD3: ":K3$:IFLEN(K3$)<1THEN510
520 IFR1$=R#(1)THEN70:REM SEARCH RIGHT NODE
530 GOTO580:REM ELSE SEARCH LEFT BRANCH
540 PRINT" PRESS RETURN TO CONTINUE"
550 GET#1:IF@CUR THEN550
560 RETURN
580 REM SEARCH LEFT BRANCH SUBROUTINE (IF NOT FULL)
590 IFLX(I)<0THENI=LX(I):GOTO520
600 REM ADD NEW LEFT LINK
610 LX(I)=J
612 N#(J)=R
620 R#(J)=R1$:REM ADD NEW RECORD
630 T1$(J)=T1$
640 PUB(J)=P1$
650 Y1$(J)=Y1$
652 I1$(J)=I1$
654 C1$(J)=C1$
656 L1$(J)=L1$
660 K1$(J)=K1$
660 K2$(J)=K2$
660 K3$(J)=K3$
700 LX(J)=0
710 R#(J)=0
  
```

More

# Listing continued.

```

720 RETURN
730 REM SEARCH RIGHT BRANCH SUBROUTINE (IF NOT FULL)
740 IFRX(I)<0 THEN I=RX(I)+1:GOTO520
760 REM ADD NEW RIGHT LINK
770 RX(I)=J
772 N(I)=J
790 AUC(J)=A1:REM ADD NEW RECORD
792 T1(I)=T1
800 AUC(J)=P1
810 YR(I)=Y1
820 IS(I)=I1
824 CR(I)=C1
826 LC(I)=L1
830 K1(I)=K1
840 K2(I)=K2
850 K3(I)=K3
860 RX(I)=0
870 LX(I)=0
880 RETURN
1000 REM LIST ALL BOOKS SUBROUTINE
1010 P=1:T=0:PRINT":REM INITIALIZE VARIABLES
1020 PRINT"DO YOU WANT A HARD COPY VERSION? Y/N"
1025 GETA:I=I:IF A=C:"Y" THEN H=0:4:SP=10
1029 OPEN4,00
1030 PRINT#4,"Q"
1040 T=T+1
1050 SX(T)=P:REM PUSH ON STACK
1060 IFC0 THEN P=LX(P):GOTO1040
1070 T=T-1
1080 IFC0 THEN PRINT"ALL BOOKS LISTED!" :FOR I=1 TO500:NEXT:PRINT#4,"S":CLOSE4,00
:RETURN
1090 P=SX(T):REM POP THE STACK
1100 X=I: LIST ALL BOOKS MODE"Y=I="ALL BOOKS IN LIBRARY"
1103 IFR(P)=0 THEN I=170
1105 IF00=3 THEN PRINT#4,(20-(LEN(X))/2):X:PRINT#4,SPC(30):Y
1107 IFC0 THEN FOR I=1 TO7:PRINT#4:NEXT:PRINT#4,SPC(30):Y
1110 PRINT#4:PRINT#4:PRINT#4
1112 PRINT#4,SPC(30),"AC #:" :X(P)
1115 PRINT#4,SPC(30),"AU: " :AUC(P):REM PRINT AUTHOR
1119 PRINT#4,SPC(30),"T1: " :T1(I):PRINT#4,SPC(30),"PU: " :PUS(P)
1120 PRINT#4,SPC(30),"YR: " :YR(I):PRINT#4,SPC(30),"IS: " :IS(I)
1122 PRINT#4,SPC(30),"CR: " :CR(I):PRINT#4,SPC(30),"L1: " :LC(I)
1125 PRINT#4,SPC(30),"K1: " :K1(I):PRINT#4,SPC(30),"K2: " :K2(I)
1130 PRINT#4,SPC(30),"K3: " :K3(I)
1140 PRINT#4:PRINT#4:PRINT#4
1150 IF00=4 THEN P=LX(P)+1:IF00=3 THEN P=LX(P):PRINT#4,"S":PRINT#4,"Q":GOTO1170
1152 IF00=4 THEN I=170
1155 PRINT"PRESS 'C' TO SEE NEXT CITATION "
1156 GETA:I=I:IF A=C:"C" THEN I=156
1160 PRINT"Q"
1170 T=T-1
1180 P=RX(P):REM CHECK RIGHT BRANCH
1190 GOTO1040
2000 REM DELETE A BOOK SUBROUTINE
2004 REM RTEMP & LTEMP ARE POINTERS TO RECORD WE WANT TO DELETE
2005 RTEMP=0:LTEMP=0
2020 X="DELETE A BOOK MODE"
2030 PRINT":PRINT#4,(20-(LEN(X))/2):X:PRINT#4:PRINT#4
2040 INPUT"ACCESSION NO. TO BE DELETED: " :N(DELETE)
2042 IFRX(DELETE)<1 THEN2050
2044 PRINT#4:IS THE TREE ROOT NODE?" :PRINT#4:"YOU CANNOT DELETE IT"
2045 PRINT"YOU MAY EDIT IT WITH ALL NEW " :PRINT#4:"INFORMATION":GOTO2310
2050 IFRX(DELETE)>1 ANDX(DELETE)<J THEN2060
2054 PRINT"ACCESSION NUMBER NOT IN DATA BASE!" :PRINT#4:"TRY AGAIN!":GOTO2040
2060 INPUT"AUTHOR: " :AUC(DELETE)
2080 PRINT:I=1:REM START AT BEGINNING OF TREE
2085 PRINT"*****"
2090 IFAUC(DELETE)>0:RAUC(I)=DELETE:THEN2340
2095 IFAUC(DELETE)>0:RAUC(I)=DELETE:THEN2340
2096 IFRX(DELETE)<0:CN(I)=DELETE:THEN2340
2097 REM RECORD FOUND
2099 PRINT"AC#:" :N(I)
2100 PRINT"AU: " :AUC(I)
2110 PRINT"TI: " :T1(I)
2120 PRINT"PU: " :PUS(I)
2130 PRINT"YR: " :YR(I)
2140 PRINT"IS: " :IS(I)
2150 PRINT"CR: " :CR(I)
2160 PRINT"LC: " :LC(I)
2170 PRINT"K1: " :K1(I)
2180 PRINT"K2: " :K2(I)
2190 PRINT"K3: " :K3(I)
2194 PRINT
2195 PRINT"*****"
2200 PRINT:PRINT"DO YOU WANT TO DELETE THIS ITEM FROM THE DATA BASE?":
2201 PRINT"PRESS 'Y' FOR YES OR 'N' FOR NO" :INPUTA:I=I:IF A="N" THEN2330
2205 IFA=C:"Y" THEN2200
2210 REM HOOK UP NODE PTRS-LTEMP OR RTEMP ARE PTRS TO N(DELETE)
2220 IFRTEMP>0 THEN R(RTEMP)=R(N(DELETE)):GOTO2230
2222 REM IF RTEMP=0 THEN LTEMP PTRS TO N(DELETE)
2224 IFLTEMP>0 THEN L(LTEMP)=L(N(DELETE)):GOTO2270
2230 I=1:REM RECORD GETS ENTERED AGAIN (LX(N(DELETE)))
2232 IFAUC(LX(N(DELETE)))>0:RAUC(I)=LX(I):THEN2242
2234 REM SEARCH LEFT BRANCH
2236 IFLX(I)<0 THEN I=LX(I):GOTO2232
2238 REM ADD NEW LINK
2240 LX(I)=LX(N(DELETE)):GOTO2230
2242 REM SEARCH RIGHT BRANCH
2244 IFRX(I)<0 THEN I=RX(I):GOTO2232
2246 REM ADD NEW LINK
2248 RX(I)=RX(N(DELETE)):GOTO2230
2270 I=1:REM RECORD GETS ENTERED (RX(N(DELETE)))
2272 IFAUC(RX(N(DELETE)))>0:RAUC(I)=RX(I):THEN2282
2274 REM SEARCH LEFT BRANCH
2276 IFLX(I)<0 THEN I=LX(I):GOTO2272
2278 REM ADD NEW LINK
2280 LX(I)=RX(N(DELETE)):GOTO2230
2282 REM SEARCH RIGHT BRANCH
2284 IFRX(I)<0 THEN I=RX(I):GOTO2272
2286 REM ADD NEW LINK
2290 RX(I)=RX(N(DELETE)):GOTO2230
2300 PRINT:PRINT"ACCESSION " :N(DELETE) : " HAS BEEN DELETED!"
2305 R=R-1
2310 PRINT"PRESS 'C' TO CONTINUE"
2315 GETA:I=I:IF A=C:"C" THEN2315
2330 RETURN
2340 REM SEARCH LEFT SIDE OF TREE FOR RECORD & PTR TO RECORD
2350 IFLX(I)<0 THEN IFLX(I)<0:CN(DELETE)=LX(I):GOTO2090
2351 IFLX(I)=N(DELETE) THEN LTEMP=I:IF00=1:GOTO2090
2352 IFLX(I)=0 THEN PRINT"BOOK NOT IN DATA BASE"
2355 GOTO2310
2360 REM SEARCH RIGHT SIDE OF TREE FOR RECORD & PTR TO RECORD
2270 IFRX(I)<0 THEN IFRX(I)<0:CN(DELETE)=RX(I):GOTO2090
2372 IFRX(I)=N(DELETE) THEN RTEMP=I:IF00=1:GOTO2090
2390 IFRX(I)=0 THEN GOTO2352
3000 REM EDIT A BOOK SUBROUTINE
3003 REM RTEMP & LTEMP ARE POINTERS TO RECORD WE WANT TO EDIT
3006 RTEMP=0:LTEMP=0
3020 X="EDIT A BOOK MODE"
3030 PRINT":PRINT#4,(20-(LEN(X))/2):X:PRINT#4:PRINT#4
3040 INPUT"ACCESSION NO. TO EDIT: " :N(EDIT)
3050 IFRX(EDIT)>0 ANDX(EDIT)<J THEN3060
3055 PRINT"ACCESSION NUMBER NOT IN DATA BASE!" :PRINT#4:"TRY AGAIN!":GOTO3040
3060 INPUT"AUTHOR: " :AUC(EDIT)
3080 PRINT:I=1:REM SEARCH AT BEGINNING OF TREE

```

# Listing continued.

```

3090 IFAUC(EDIT)>0:RAUC(I)=EDIT:THEN3360
3100 IFAUC(EDIT)>0:RAUC(I)=EDIT:THEN3340
3103 IFRX(EDIT)<0:CN(I)=EDIT:THEN3340
3105 REM RECORD FOUND
3110 PRINT"IF 'NEW' = 'OLD' THEN PRESS 'RETURN' "
3115 PRINT#4,(15):*****
3120 PRINT"ACC #:" :N(I)
3130 PRINT"OLD AUTHOR: " :AUC(I)
3140 INPUT"NEW AUTHOR: " :AUC(I):IF01(I)<0:"* THEN AUC(I)=01#
3150 PRINT"OLD TITLE: " :T1(I)
3160 INPUT"NEW TITLE: " :T1(I):IF01(I)<0:"* THEN T1(I)=01#
3170 PRINT"OLD PUBLISHER: " :PUS(I)
3180 INPUT"NEW PUBLISHER: " :PUS(I):IF01(I)<0:"* THEN PUS(I)=01#
3190 PRINT"OLD YEAR: " :YR(I)
3200 INPUT"NEW YEAR: " :YR(I):IF01(I)<0:"* THEN YR(I)=01#
3210 PRINT"OLD ISBN #:" :IS(I)
3220 INPUT"NEW ISBN #:" :IS(I):IF01(I)<0:"* THEN IS(I)=01#
3230 PRINT"OLD CATALOG #:" :CR(I)
3240 INPUT"NEW CATALOG #:" :CR(I):IF01(I)<0:"* THEN CR(I)=01#
3250 PRINT"OLD LIBRARY CONGR#:" :LC(I)
3260 INPUT"NEW LIBRARY CONGR#:" :LC(I):IF01(I)<0:"* THEN LC(I)=01#
3270 PRINT"OLD KEY1: " :K1(I)
3280 INPUT"NEW KEY1: " :K1(I):IF01(I)<0:"* THEN K1(I)=01#
3290 PRINT"OLD KEY2: " :K2(I)
3300 INPUT"NEW KEY2: " :K2(I):IF01(I)<0:"* THEN K2(I)=01#
3310 PRINT"OLD KEY3: " :K3(I)
3320 INPUT"NEW KEY3: " :K3(I):IF01(I)<0:"* THEN K3(I)=01#
3330 RETURN
3340 REM SEARCH LEFT SIDE OF TREE
3350 IFLX(I)<0 THEN I=LX(I):GOTO3090
3360 REM SEARCH RIGHT SIDE OF TREE
3370 IFRX(I)<0 THEN I=RX(I):GOTO3090
3380 PRINT"ITEM NOT IN DATA BASE!" :PRINT"PRESS 'C' TO CONTINUE!"
3385 GETA:I=I:IF A=C:"C" THEN3385
3390 RETURN
4000 REM SEARCH DATA BASE MODE SUBROUTINE
4020 X="SEARCH DATA BASE MODE" :Y="BOOKS IN LIBRARY"
4030 PRINT":PRINT#4,(20-(LEN(X))/2):X:PRINT#4:PRINT#4
4040 PRINT#4:PRINT#4:PRINT#4
4050 PRINT#4:PRINT#4:PRINT#4
4060 PRINT#4:PRINT#4:PRINT#4
4070 PRINT#4:PRINT#4:PRINT#4
4075 PRINT#4:PRINT#4:PRINT#4
4080 PRINT#4:PRINT#4:PRINT#4
4085 PRINT:PRINT#4:PRINT#4
4097 P=1:T=0:REM INITIALIZE VARIABLES
4099 INPUT"SELECTION: " :I:IF01(I)<0:5:THEN4099
4200 IF0=5 THEN CLOSE4,00:RETURN
4220 INPUT"SEARCH QUERY: " :Q1#
4300 PRINT
4310 PRINT"DO YOU WANT A HARD COPY VERSION? Y/N"
4315 GETA:I=I:IF A=C:"Y" THEN4315
4320 IFC0:"Y" AND0=C:"N" THEN4315
4325 00=3:SP=1:IF0="Y" THEN00=4:SP=10
4327 OPEN4,00
4329 PRINT#4,"Q"
4330 T=T+1
4340 SX(T)=P:REM PUSH ON STACK
4350 IFC0 THEN P=LX(P):GOTO4330
4360 T=T-1
4370 IFC0 THEN4380
4375 PRINT"SEARCH COMPLETED! - ALL ITEMS SEARCHED"
4377 FOR I=1 TO500:NEXT:PRINT#4,"S":CLOSE4,00:GOTO4020
4380 P=SX(T):REM POP THE STACK
4385 00=4:GOTO4020:4380:4380:4380
4410 IF0=3 THEN PRINT#4,(20-(LEN(X))/2):X:GOTO4420
4415 IF0=0 THEN FOR I=1 TO5:PRINT#4:NEXT:PRINT#4,SPC(32):Y
4420 PRINT#4:PRINT#4:PRINT#4
4430 PRINT#4,SPC(30),"AC #:" :N(I)
4440 PRINT#4,SPC(30),"AU: " :AUC(I)
4450 PRINT#4,SPC(30),"T1: " :T1(I):PRINT#4,SPC(30),"PU: " :PUS(I)
4460 PRINT#4,SPC(30),"YR: " :YR(I):PRINT#4,SPC(30),"IS: " :IS(I)
4470 PRINT#4,SPC(30),"CR: " :CR(I):PRINT#4,SPC(30),"L1: " :LC(I)
4480 PRINT#4,SPC(30),"K1: " :K1(I):PRINT#4,SPC(30),"K2: " :K2(I)
4490 PRINT#4,SPC(30),"K3: " :K3(I)
4500 PRINT#4:PRINT#4:PRINT#4
4510 IF0=4 THEN P=LX(P)+1:IF0=3 THEN P=LX(P):PRINT#4,"S":PRINT#4,"Q":GOTO4550
4530 IF0=4 THEN4550
4535 PRINT"PRESS 'C' TO SEE NEXT CITATION "
4536 GETA:I=I:IF A=C:"C" THEN4536
4537 PRINT"Q"
4550 T=T-1
4560 P=RX(P):REM CHECK RIGHT BRANCH
4570 GOTO4330
4600 IFRIGHT(I,1)=0:"* THEN IFLX(I,1)=LEFT(I,1):GOTO4410
4602 IFC0:RAUC(I)=I THEN4550
4605 GOTO4410
4610 IFRIGHT(I,1)=0:"* THEN IFLX(I,1)=LEFT(I,1):GOTO4410
4612 IFC0:TI(I)=I THEN4550
4615 GOTO4410
4620 IFRIGHT(I,1)=0:"* THEN IFLX(I,1)=LEFT(I,1):GOTO4410
4622 IFC0:PU(I)=I THEN4550
4630 ZK=LEFT(I,1):GOTO4410:ZK=LEFT(I,1):GOTO4410
4631 ZV=LEFT(I,2):GOTO4410:ZV=LEFT(I,2):GOTO4410
4632 IFRIGHT(I,1)=0:"* THEN IFLX(I,1)=LEFT(I,1):GOTO4410
4634 IFC0:K1(I)=I AND01(I)<0:K2(I)=I AND01(I)<0:K3(I)=I AND01(I)<0:GOTO4410
4635 GOTO4410
8000 REM WRITE NEW RECORDS SUBROUTINE
8010 SCRATCH DO "BOOKSHELF"
8020 DOEN#1,"BOOKSHELF",J
8030 IFC0 THEN PRINT#1:STOP
8040 PRINT#1:P,CR#,J
8050 FOR I=1 TO R
8055 PRINT#1,N(I)
8060 PRINT#1,AUC(I):CR#1(I):CR#PUS(I)
8070 PRINT#1,LX(I):CR#1(I):CR#K1(I)
8075 PRINT#1,LX(I):CR#1(I):CR#K2(I)
8087 PRINT#1,K3(I):CR#1(I):CR#K3(I)
8090 NEXT I
8100 CLOSE#1
8110 RETURN
READY.

```

Each month Microcomputing will publish Apple, Atari, Commodore, Heath or IBM PC translations of selected programs published in the magazine. We encourage our readers to submit a hard copy of their conversions along with a cassette or disk of the program. Include a self-addressed, stamped envelope for the return of magnetic media if not selected for publication. Authors whose translations are chosen will receive payment for their efforts.



# CLUB NOTES

## **Nevada Cobol Newsletter**

The first issue of the Nevada Cobol User's Group newsletter appeared in September. Bob Blum, the editor, wants to hear from anyone with ideas about regular columns.

For subscription or other information, write or call Nevada Cobol User's Group, 5536 Colbert Trail, Norcross, GA 30092; 404-449-8948.

## **Fairfield County, IBM PC Club**

The Fairfield County IBM Personal Computer User's Club has been formed in the Stamford area.

For information, call or write Davis Foulger, 69 River St., New Canaan, CT 06840; 203-966-9378.

## **Rochester, New York, Society**

The Rochester Area Microcomputer Society (RAMS!) maintains a computerized bulletin board. Call 716-244-9531.

For membership or other information, write RAMS, PO Box 90808, Rochester, NY 14609.

## **San Jose, California, Sinclair Newsletter**

*Sinclair MicroNews* is a new, user-supported publication dedicated to Sinclair machines. It contains programs, programming techniques and tutorials, and user reports on software and hardware products; it also provides a forum for the exchange of ideas and programs.

For information and a sample issue, send \$2 to Sinclair MicroNews, c/o James Schontzler, 1280 Paddington Way, San Jose, CA 95127.

## **Tulsa, Oklahoma, Computer Society**

The Tulsa Computer Society meets the last Tuesday of each month. Its publication, the *I/O PORT*, comes with the \$6 annual membership.

For more information and meeting times and places of user groups, write the Tulsa Computer Society, Inc., PO Box 1133, Tulsa, OK 74101, or call 272-2996.

## **Northern Oklahoma Dungeoneers**

An expanding and multi-state newsletter is published by the Northern Oklahoma Dungeoneers. For information, address the Dungeoneers at PO Box 241, Ponca City, OK 74602, or call 405-762-0349.

## **Sinclair User's Network**

The Sinclair User's Network (S.U.N.) is a nationwide group for Sinclair owners, publishing a quarterly newsletter and monthly bulletins.

Anyone wishing an informational brochure should write or call S.U.N., 2170 Oak Brook Circle, Palatine, IL 60067; 312-934-9375.

## **Toronto Group**

The Toronto Region Association of Computer Enthusiasts, happily condensed to TRACE, holds general meetings at 8 p.m. on the fourth Friday of each month during the winter, except for December, in Room J206, at the Humber College in Rexdale.

Annual membership dues of \$13 includes a subscription to the newsletter. For information, write TRACE, PO Box 6922, Station A, Toronto, Ontario M5W 1X6.

## **International SuperPET Group Publication**

The SuperPET User's Group, with international membership, now publishes *The SuperPET Gazette*. A free copy of the September issue, including membership information, can be obtained by sending a request with a 20-cent U.S. stamp to The Editor, SuperPET Gazette, PO Box 411, Hatteras, NC 27943.

## **Winnipeg PET Group**

The Winnipeg PET User's Group meets the first Wednesday of each month to see demonstrations and exchange information on Commodore microcomputers.

Annual dues of \$15 include the WPUG newsletter and access to more than 3000 programs in the disk library.

For more information, contact WPUG, c/o Larry Neufeld, 9-300 Enniskillen Ave., Winnipeg, Manitoba R2V 0H9.

## **Mansfield, Ohio, Computer Club**

The North Central Ohio Computer Society is eager to hear from interested persons in the local area or far away.

For information on meetings and activities, write John Ness, Secretary, NCOCS, PO Box 965, Mansfield, OH 44901.

## **Portland, Oregon, TRS-80 Group**

The Portland Area TRS-80 Users Group (PAUG) meets the first and third Thursday of every month at 7:30 p.m. Write PAUG at PO Box 02500, Portland, OR 97202, or call 1-800-452-2444 (days) or 1-503-659-4088 (evenings) for more information.

## **List of Sinclair User's Groups**

SYNTAX, the monthly publication of The Harvard Group (named after the town, not the University), periodically prints a list of Timex/Sinclair user's groups all over the country.

For subscription or other information, write or call Syntax ZX80, Inc., RD 2, Box 457, Harvard, MA 01451; 617-456-3661.

## **Long Island, New York, Computer Association**

LICA, the Long Island Computer Association, Inc., meets on the third Friday of each month at 8:00 p.m. in Room 508, Building 500, of the New York Institute of Technology, Old Westbury Campus.

For membership or other information, write or call Al Levy, PO Box 71, Hicksville, NY 11801; 516-293-8368.

## **New Jersey IBM PC User's Group**

The IBM PC User's Group of Northern New Jersey meets on the third Thursday of each month at the Student Center, Montclair State College, Montclair, NJ.

For information, contact Joe McDermott, 201-489-3877 (evenings) or Irving Lang, 212-869-5066 (days).

## **North Texas IBM PC Group**

The North Texas IBM Personal Computer Users Group welcomes inquiries from interested users in the area. Address all correspondence to Editor, North Texas PC News, 2025 Rockcreek Drive, Arlington, TX 76010, or call 817-275-4109.

# Announcing ....A New, Authoritative Guide to The Most Important Book Ever Published for the Apple.

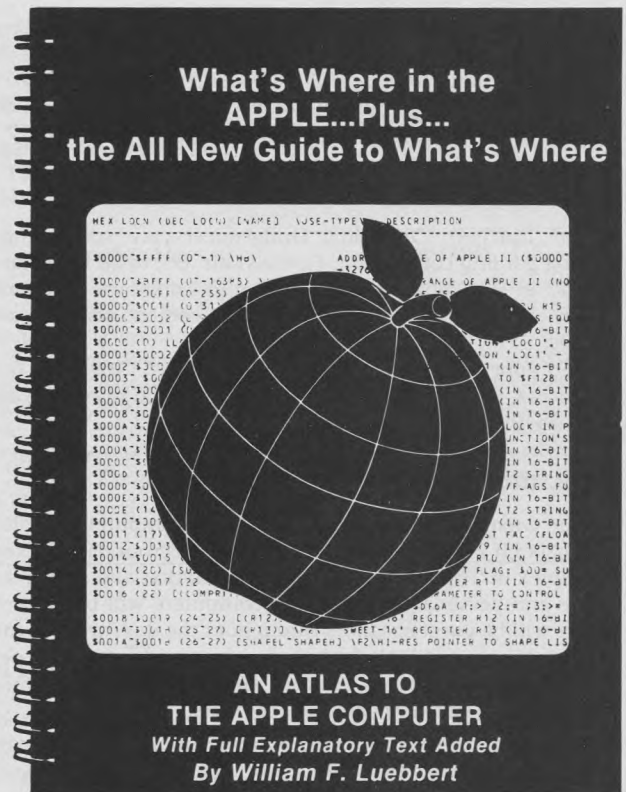
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is William F. Luebbert's Revised Edition of the famous Apple Atlas. The original *What's Where in the APPLE?* provided more information on the Apple's memory than was available anywhere else. Now the *Revised Edition* shows you how to use this valuable data.

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# CALENDAR

## Seattle Education Conference

The sixth annual Computers in Education Conference will be held March 18-19 on the campus of Seattle Pacific University, in Seattle, Washington. The conference is designed for the elementary or secondary educator or administrator interested in the changing role of the microcomputer in education.

For more information and preregistration forms, contact Tony Jongejan, Everett High School, 2416 Colby, Everett, WA 98201; telephone 206-334-6965.

## Computer Faire

Thousands of people will be jamming the 8th West Coast Computer Faire on March 18-20 in San Francisco's Brooks Hall and Civic Auditorium.

For further information, write or call Computer Faire, 345 Swett Road, Woodside, CA 94062; telephone 415-851-7077.

## Oklahoma Dungeoneers

The Northern Oklahoma Dungeoneers are sponsoring a spring gaming convention, FantasyLair '83, to be held March 25-27 at the Tonkawa High School in Tonkawa, Oklahoma. There will be a tournament, a costume contest, seminars and prizes.

For more information, contact the Northern Oklahoma Dungeoneers, PO Box 241, Ponca City, OK 74602; telephone 405-762-0349.

## Baltimore Computerfest

The Greater Baltimore Hamboree and Computerfest will be held March 27th at the Maryland State Fairgrounds Exhibition Complex in Timonium, Maryland. Exhibition and sale of software and personal and business computers will be featured; there will be guest speakers throughout the day, and flea market spaces are available for hobbyists.

For more information, contact GBH & C, PO Box 95, Timonium, MD 21093; telephone 301-561-1282.



"Honey, did you notice how the lights dimmed when I turned on the dishwasher?"

## Color Graphics in Florida

The International Computer Color Graphics Conference is scheduled for March 10-12 at Florida State University in Tallahassee.

For information, write or call Dr. Harold B. Crosby, 314 Westcott Hall, Florida State University, Tallahassee, FL 32306; telephone 904-644-6876.

## Localnet '83 (Europe)

Localnet '83 (Europe), a conference focusing on local net systems, will be held March 8-10 at the Royal Lancaster Hotel in London. (A similar conference, Localnet '83 USA, will take place in June in New York.)

For information, call Online Conferences Ltd., Northwood (09274)28211 (from the United Kingdom), or 44-9274-28211 (from the United States or Canada), or write Online at Argyle House, Northwood Hills, HA6 1TS, Middlesex, UK.

## Computers in Special Education

A National Topical Conference on the Use of Microcomputers in Special Education is scheduled for March 10-12 in Hartford, Connecticut. Many aspects of the role microcomputers can play in the education of handicapped and gifted children will be addressed.

For details and preregistration and housing forms, write John Grossi, Conference Manager, The Council for Exceptional Children, Department of Field Services, 1920 Association Drive, Reston, VA 22091.

## Michigan Conference on Computers in Education

The Michigan Association for Computer Users in Learning will hold its seventh annual conference on March 14-15 at the Hyatt Regency in Dearborn, Michigan. Over 2000 educators from the Midwest are expected to attend.

For further information, contact Betty VandenBosch Shaw, Coordinator of Mathematics, Flint Community Schools, 923 East Kearsley, Flint, MI 48502; telephone 313-762-1007.

## Federal Office Systems Expo

The Seventh Annual Federal Office Systems Expo (FOSE) will be held at the new Washington Convention Center, Washington DC, March 14-17.

For more information or a copy of the conference brochure, contact Mary Beth Gouled, National Trade Productions, Inc., 9418 Annapolis Road, Lanham, MD 20706; telephone 301-459-8383 or 800-638-8510.

## Education Conference in Arizona

The College of Education of Arizona State University is hosting the third annual Microcomputers in Education Conference on March 17-19 in Tempe. A variety of workshops, demonstrations and presentations will address the role of the computer in revolutionizing the teaching and learning process.

For registration materials and information, write or call Marilyn Sue Ford, B-47 Payne Hall, College of Education, Arizona State University, Tempe, AZ 85287; telephone 602-965-7363.

## San Diego Computer Expo

The second annual Pacific Computer Expo will take place February 18-21 at the San Diego Convention and Performing Arts Center. In addition to some 150 exhibits, there will be over 100 seminar presentations covering all aspects of computer technology.

For information, call Carol Houts, 800-528-2355, toll-free.

## Office Automation Conference

The fourth annual Office Automation Conference will take place February 21-23 at the Civic Center in Philadelphia. It will feature more than 200 exhibits and some 50 technical sessions on topics ranging from technology to human factors and social issues.

For more information, contact AFIPS, 1815 North Lynn St., Arlington, VA 22209; telephone 703-558-3624.

## Australian PC Show

The first Australian Personal Computer Show will take place March 10-12 at Centrepont Sydney. The show's main aim is to answer the questions of the personal computer buyer.

For more information, write Graeme Selby, 1250 Malvern Road, Malvern, Victoria, Australia 3144, or call (03) 20 1208.

## Rocky Mountain Show

The Rocky Mountain Regional Computer Show and Software Exposition will take place Thursday to Sunday, February 3-6, at the Denver, Colorado, Merchandise Mart, 10:30 a.m. to 6:30 p.m. daily. Admission is \$5 for adults and \$3 for children.

For more information, call or write Northeast Expositions, 824 Boylston St., Chestnut Hill, MA 02167; telephone 617-739-2000.

## Third Annual TALMIS Conference

The Third Annual TALMIS Electronic Publishers and CBT Users Conference will be held February 16-18 at the Ambassador West in Chicago. The meetings will be directed at software publishers and users of microcomputer-based training.

For more information, contact Mary O'Keefe, TALMIS, Inc., 115 North Oak Park Ave., Oak Park, IL 60301; telephone 312-848-4000.

# CLASSIFIEDS

Classified advertisements are intended for use by persons desiring to buy, sell or trade used computer equipment. No commercial ads are accepted.

Two sizes of ads are available. The \$5 box allows up to 5 lines of about 35 characters per line, including spaces and punctuation. The \$10 box allows up to 10 lines. Minimize use of capital letters to save space. No special layouts allowed. Payment is required in advance with ad copy. We cannot bill or accept credit.

Advertising text and payment must reach us 60 days in advance of publication (i.e., copy for March issue, mailed in February, must be here by Jan. 1). The publisher reserves the right to refuse questionable or inapplicable advertisements. Mail copy with payment to **Classifieds, Microcomputing**, Peterborough, NH 03458. Do not include any other material with your ad as it may be delayed.

Wanted: used Sorcerer S-100 expansion unit or Exidy S-100 interface card. Call evenings 613-384-3081 or write: Yvon Mayo, 930 Pembroke, Kingston, Ont. K7M 6C5, Canada.

For sale: Televideo 912C terminal; two months old, with cover. \$650 or offer. Call Rich Pagnusat, 312-981-1000, ext. 237, 8:30 am-5:00 pm CST.

ZX81/TS1000 Users: Free newsletter and software available from Z-WEST User's Group. No SASE, no money—just your name and address. Write us at PO Box 2411, Vista, CA 92083.

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# DEALER DIRECTORY

**Dealers:** Listings are \$15 per month in prepaid quarterly payments, or one yearly payment of \$150, also prepaid. Ads include 25 words describing your products and services plus your company name, address and phone. (No area codes or merchandise prices, please.) Call Marcia at 603-924-9471 or write *Microcomputing*, Ad Department, Peterborough, NH 03458.

## Nokomis, FL

We are the leading area computer store. We carry Cromemco, Apple, Vector Graphic; printers and terminals. We offer full software support including G/L, A/R, payroll and word processing. **Computer Centre**, 909 S. Tamiami Trail, PO Box 130, Nokomis, FL 33555. 484-1028.

## Aurora, IL

Full line of Apple Computers and software. Hewlett-Packard Personal Computers, Calculators and Supplies. IDS Prism, SMC and Daisy-writer Printers. **Farnsworth Computer Center**, 1891 North Farnsworth Ave., Aurora, IL 60505 (851-3888) and 383 East North Ave., Villa Park, IL 60181 (833-7100).

## Farmington Hills, MI

Microcomputer CP/M systems and database software for business applications. Integrated, customized and supported by a "computer whiz" MBA. For professional, quality service contact **Bruce Sherman**, 24989 Woodridge Triangle, Farmington Hills, MI 48018. 471-4984.

## Akron, OH

Atari video game authorized independent servicer. Games serviced by factory trained technicians. Fast turnaround. Dealer inquiries invited. We stock genuine Atari game and joystick parts. **Greensburg Electronics**, 2618 Massillon Road, Akron, OH 44312. 644-3178.

## Houston, TX

Medical microcomputing software for the Apple and IBM Personal Computers. Thoroughly tested in major medical centers. Programs for cardiac catheterization, echocardiography, OB ultrasound, intensive care. **Trinity Computing Systems**, 1020 Holcombe, Suite 408, Houston, Texas 77030. 790-1894.

## Sneak Previews

Here's a look in advance at some of the topics *Microcomputing* will be covering in the upcoming months.

The March 1983 issue of *Microcomputing* will feature expanded coverage of the Timex 1000/Sinclair ZX-81 microcomputer. Many of our readers, attracted by the under-\$100 price tag of these micros, have purchased one of these inexpensive units and are wondering what now to do with them. *Microcomputing* will tell them in its March issue with a look at some "serious" applications for this "toy" computer.

The magazine focuses in on the Epson machines in the April issue with a look at Epson's latest developments, in-

cluding the portable HX-20 microcomputer. We'll examine interfacing the Epson printer to microcomputers and inform the reader how to turn his printer into an artist.

In May, *MC* will take a look at the wonderful world of Winchester and hard disks. We will include a feature article about this new hard disk technology and explain how to go about selecting and interfacing a Winchester disk. Also, *Microcomputing* technical editor G. Michael Vose will take us on a behind-the-scenes look at manufacturing hard disks. We'll also publish a comprehensive list of Winchester and hard disk products along with their characteristics.



# The Basics of Word Processing A Guide for Micro Interfacing Tips for CP/M Programmers More Microprocessor Material

## Introduction to Word Processing

Hal Glatzer  
Sybex, 1981  
2344 Sixth St.  
Berkeley, CA 94710  
Softcover, 205 pp., \$12.95

If you're involved in selling word processing systems or the components thereof, you'd be well-advised to buy a stack of copies of *Introduction to Word Processing* and hand them out to prospective customers. If you're in the market for a word processing system, or are trying to convince your boss to buy one for you, this book will prove invaluable to you in your quest.

This is *not* a how-to-do-it tutorial on any or all word processors. As its title implies, it's an introduction to the field, explaining what word processors are, their history and what they can do for users ranging from secretaries to realtors to engineers to nontyping executives.

The book is people-oriented, rather than being a catalog of machinery. It tells you what a word processor can and cannot do for you in any particular situation.

Author Hal Glatzer is a journalist, and the organization, readability and depth of research demonstrated in this book testify to his abilities as an "explainer" (as he describes himself). Nowhere is the book bogged down in technicalities or the details of any one word processor. Instead, Glatzer gives an overview of what word processors are doing for us today, what they cost and some hints of what the future holds.

The author gives equal time and consideration to word processor programs running on mainframes, minicomputers, stand-alone word processing machines and programs that run on microcomputers. Glatzer even includes coverage of "intelligent" typewriters.

If you're having trouble convincing a customer, your boss or your chief accountant on the merits of word processing, let the first chapter, "What Word

Processors Can Do For You," do the arguing for you. Just reading this chapter aroused my enthusiasm—and I already own a word processor!

Some of the background material in this book, while interesting, does not directly relate to the modern word processor or its usage. Most of the book, however, is a description of how the machines work and how they can aid you in your particular job.

*Intro to Word Processing* does have one slight deficiency. I would like to have seen the author include a word processor evaluation and comparison chart—not one already filled in, but an outline for comparisons that the prospective customer could make for himself. Guidelines for doing this are scattered throughout the book; it would have been nice if the author had included a summary in the form of a blank evaluation matrix so the customer could fill it in and then see what each machine offers and what their differences are.

Since no two word processors are alike, the author explains how to ask the right questions to find out the features and weaknesses of each machine. A simple benchmark test is described, and the prospective buyer is advised to demand a demonstration that includes all of the tasks specific to his requirements.

Naturally, each salesman will want to show off the strong points of the machine he is pushing. After reading this book, the customer will be ready to ask about all the other features that are available.

In addition to background and evaluation material, the book includes a lot of advice for the first-time user. I especially like the chapter on "How to Manage Your Files." As a dummy who's lost too many files, I can speak from experience and testify that the guidelines for carefully naming and backing up files should be read and followed by every computer user. A little care will save many tears.

*Intro to Word Processing* is a serious book for the serious prospective buyer of a word processor. The modest price (\$12.95) is a wise investment, returning hard facts and leaving the reader with a

good overall feel for what a word processor can do for him in his particular endeavor. (It's a shame that the quality between the covers was not reflected in the cover artwork, which unfortunately looks like an ad for a game program.)

If you're in the market for a word processor, this book is the right place to start.

**Ken Barbier**  
Borrego Springs, CA

## Microprocessor Interfacing

Joseph Carr  
Tab Books, 1982  
Blue Ridge Summit, PA 17214  
Softcover, 246 pp., \$7.95  
Hardcover, \$13.95

Billed as a "designer's guide to memory devices, input/output ports and interfacing with the analog world," *Microprocessor Interfacing* has a tall order to fill.

The result can't be called a "cook-book," nor should it be classified as a classroom-style text. *Microprocessor Interfacing* falls somewhere in between the two categories.

Much of the 246-page book is devoted to refreshing the reader on popular logic devices, operational amplifiers, power supplies and elementary microcomputer layout. The rank beginner will come away with slightly more knowledge than he started with, while the expert is likely to set the book aside in boredom.

*Microprocessor Interfacing* is a good example of the hazards of writing for the "average" reader, a creature that exists only in the minds of publishing executives.

Some chapters, like the ones on microprocessor control signals and single-board computers, are so short that you wonder why they were included. Other sections of the book dwell on esoterics, such as a proprietary chip used in car radios.

Ten pages are devoted to adapting surplus keyboards. Two or three years

ago, many hobbyists did this; today, it's a rarity.

*Microprocessor Interfacing's* strongest chapters cover the theory of data conversion, and generalities finally give way to concrete applications.

After considering the range of topics that *Microprocessor Interfacing* attempts to cover, I can begrudgingly say that the author has done a fair job of giving each of them the once-over. Unfortunately, the hobbyist who wants to interface his store-bought microcomputer needs more practical information, and the serious student requires greater substance.

Before acquiring *Microprocessor Interfacing*, I relied on *Kilobaud Classroom* (Wayne Green Books) for a thorough treatment of digital electronic basics and the *IC Converter Cookbook* (Howard W. Sams & Co.) for practical conversion circuitry. *Microprocessor Interfacing's* greatest advantage over these two is its cost—\$7.95, as compared to \$14.95 and \$13.95.

Of course, I would rather pay a few extra dollars to get something more than the once-over.

**Tim Daniel**  
Oxford, OH

## **Introduction to CP/M Assembly Language (Functions and Applications)**

Jon Lindsay  
Executive Computer, 1982  
PO Box 22178  
Carmel, CA 93922  
Softcover, 174 pp., \$15.95

For any assembly-language programmer working with CP/M, *Introduction to CP/M Assembly Language* is a must. Jon Lindsay has filled a long-existing gap in available tutorial information with his cogent, well-organized and practical guide to CP/M input/output functions.

With the exception of the cryptic (for a novice) *Digital Research CP/M Interface Guide*, previous writing I've found on this subject is limited to a few pages of minimal information in assembly-language primers.

In *Intro to CP/M Assembly Language*, a short introductory portion covers some elementary assembly programming concepts and describes the use of CP/M ASM, Load and other utilities. However, this is not a generalized assembly-language tutorial; it deals specifically with the CP/M system functions. Chapter 2 dives right into the functions, and includes a fine discussion of use of the stack.

Lindsay provides short routines for each of the more widely used CP/M input/output functions, with detailed explanations of routines. Listings are heavily

commented on and valuable programming tips are contained in the textual discussion. I found the description of the File Control Block and its use particularly effective.

You can use combinations of the function calls and routines to build a single-disk copy program similar to the dual-drive program in the *CP/M Interface Guide*. This program teaches you to use sequential files. The *Interface Guide* makes a lot more sense and is more useable to you after the enlightenment gained from Lindsay.

Two chapters of the book are devoted to random-access functions and a routine for exercising these functions with a list of names, addresses and descriptive data in a message. The detailed tutorial gives you useful programming-technique guidance.

The final two chapters discuss computer logic for game situations and demonstrate the use of tables. A complete Tic-Tac-Toe program is used for illustration.

The first two appendixes contain 8080 op codes in hex and alpha order with comments. Appendix C lists decimal and hex values generated by Control and another key in combination. A complete list of CP/M functions with short descriptions is in Appendix D. Appendix E repeats the File Control Block information in condensed form. Appendix F is an excellent five-page troubleshooting guide for common bugs. A quick reference index completes the book.

Jon Lindsay is to be commended for his preparation of this guided tour through the CP/M functions. This book is a classic that belongs on the reference shelf of all CP/M assembly-language programmers.

**Charles R. Perelman**  
Beverly Hills, CA

## **Microprocessors for Measurement and Control**

David Auslander and Paul Sagues  
Osborne/McGraw Hill, 1981  
630 Bancroft Way  
Berkeley, CA 94710  
Softcover, 310 pp., \$15.99

*Microprocessors for Measurement and Control* is obviously written for use in some engineering class, and in that case, an enlightened instructor may make it useful to students.

But for nonstudents, this David Auslander-Paul Sagues book is too superficial—it's muddled with trivial detail and thoroughly padded with large diagrams that would be just as useful at half the size. At the same time, the authors try too hard to cover too much, but they don't hit all the high points.

Indeed, half the book is "filler"—software listings that are written with detail and reasonable comment but that proba-

bly won't be used by anyone but a student. Although the book is 310 pages thick, there are only 157 pages of text.

The first of nine chapters is an embellished copy of the preface, listing in more detail the several case studies that are used as educational vehicles. The second covers information and power supplies and includes five pages describing analog and digital signaling in the briefest of terms.

Chapter 3 describes dc motor control. One system used in an example consists of a simple dc motor driving a vane to interrupt light going to a photocell. After an in-depth discussion on how this "chopper" circuit is used to control the speed of the motor, the authors end the chapter with a circuit diagram of a three-voltage power supply using 7800-series regulators and a motor-driver circuit.

Stepping motors are covered in the fourth chapter. High-level languages are not efficient in stepper motor control, the authors write, because of speed (too slow) and memory requirements (too large).

Chapter 5 includes the first of the case studies—this one about temperature control. A case study in chapter 6 describes how to control two pumps to blend liquids. The only computer concept in this chapter is that of interrupts.

An automatic weighing system is presented in chapter 7. Several diagrams depict variations of an electronic scale, and two half-page figures show an unfiltered strain gauge output and then a filtered example of the same signal.

A "polar" plotter (one that has a swing arm, like that of a radial-arm saw, with a pen that can move along the arm) is described in a chapter 8 case study. The study includes a review of the state of the art (for example, typical x/y plotters).

The final case study, presented in chapter 9, explains how to make an automatic cutting machine. Design considerations are discussed to see if anything but a microprocessor controller could be used (nothing could); a one-page transition diagram with five bubbles was derived to control the cutter.

While *Microprocessors for Measurement and Control* is printed in a clean style, with particularly good photos of the projects, the material is presented in an inconsistent manner. Some areas are covered in detail (for example, four pages are devoted to flowchart input and output character routines), but other topics are given little consideration (for example, noise problems or failsafe and safety mechanisms in the cutting machines).

It's difficult to figure out why authors with the credentials of Sagues and Auslander would deal with an 8080 controller just because they liked the form. This is 1983, and students in engineering classes should be taught with state-of-the-art components.

**Jim Hansen**  
New Boston, NH



## Breaking Words

Syllables is an instructional game for use on the Apple, PET and TRS-80 microcomputers. The game is designed to motivate students to compete against their own scores and improve their speed in recognizing and applying the rules of dividing words into syllables.

Teachers can use Syllables for any list of words in any curriculum. The program offers the child immediate feedback and this allows the teacher the benefit of not having to respond to the tasks of 30 to 180 students a day.

Syllables is available from School & Home Courseware, Inc. (1341 Bulldog Lane, Suite C, Fresno, CA 93710). The game appears in Volume 3, Number 1 of School Courseware Journal. Also included in the issue, at the price of \$16.95 for cassette or \$19.95 for disk, is a second program called Coins. Reader Service number 461.

## Statistical Analysis

SoftCORP International, Inc. (229 Huber Village Blvd., Westerville, Ohio 43081), is introducing a statistical analysis system for Apple II computers. SpeedStat Volume 1: Frequencies & Crosstabs has a capacity of over 10,000 data points and over 30 different statistical measures.

SpeedStat is designed for small business and professional users, including marketing professionals. It allows statistical analyses of demographic studies, product testing and market research to be performed easily.

SpeedStat requires an Apple II or Apple II Plus with 48K and two disk drives. It sells for \$250. Reader Service number 462.

## Prepare Yourself

Educat 2000 is a series of self-study programs designed to help the user prepare to take certification/li-

censing examinations in the following occupations: real estate, private pilot, building contractor, apprentice electrician, apprentice plumber, medical assistant, dental assistant, computer operator, personnel management, public relations and others.

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Each question is designed to reflect the actual exam situations you would encounter when applying for a State of California certification/license. Although Educat 2000 is designed for California requirements, each course covers the knowledge pertinent to state examinations throughout the U.S.

The initial versions run in North Star Basic with 64K; however, CP/M versions for the Apple and TRS-80 will be released soon.

Each program costs \$299 and is available from Magnum West, PO Box 10558, San Francisco, CA 94116. Reader Service number 463.

## Timex-Sinclair Software Series

Mindware, Inc. (15 Tech Circle, Natick, MA 01760), has introduced a series of 20 quick-loading programs for the Timex-Sinclair 1000 and Sinclair ZX-81 personal computers. The series includes business, engineering and programming software, as well as arcade and intellectual games.

An important feature of the software is a proprietary Quickload feature which loads the program up to four times faster than conventional Timex-Sinclair software. The Quickload feature also verifies whether or not the computer is loading properly.

The Mindware series consists of six business programs—an electronic spreadsheet, database management, word processing, inventory control, forecasting/graphs

and video slide show software. There are also two engineering programs available—critical path analysis and equation solving, and three advanced programming aids—programmer's tool kit, screen display and a monitor.

The game selections include Gulp, Labyrinth, Pilot, Graphic Golf, Crossword, Anagrams, Word Test, Multiple Choice Test and Cosmos. The software is priced between \$9.95 and \$24.95. Reader Service number 460.

## Survival of the Fittest

Microcosm (from Aeon Concepts, Computer Products Division, 1657 Red Mill, Box 12595, Pittsburgh, PA 15241) is a strategic and analytical game for the IBM Personal Computer. The game is based on a simulation of birth, life, migration and death among populations of microorganisms. In solitaire modes, the player can experiment with colonies as they rapidly evolve into patterns.

In competition modes, two players match wits to create the most fertile colony. Microcosm features storage and recall of 50 standard and 30 user-created colonies; Future-See, to preview the effect of moves on the next generation of evolution; Mutation, to change the rules and restructure the game; and a thoroughly programmed tutorial.

The game is available for \$39.95 (plus \$2 postage and handling). Reader Service number 467.

## An Executive's Database

PowerBase, from GMS Systems (12 West 37th St., New York, NY 10018), is a relational database management system which allows an executive to access information and perform business functions. Designed for use with the IBM Personal Computer using PC DOS, PowerBase can inter-

face with mainframe computers through its Inload and Outload utility programs, and appropriate communication software.

The PowerBase package comes with a search, sort and select feature; special search keys for "sound like" retrieval; a strong front end editor; and the capability to handle arithmetic expressions written in familiar algebraic form.

The DataZoom feature allows you to focus on any information within a database and show the detailed components of that information.

PowerBase's ready-to-run applications include The Manager's Daily Planner, Financial/Insurance Records Inventory, Expense Reporting and Telephone/Mailing Directory. The system runs on the IBM Personal Computer with at least 128K RAM, PC DOS, two disk drives storing at least 160K each (or hard disk equivalent), a cursor-addressable terminal and a printer capable of an 80-column width.

PowerBase comes with a user's manual, reference manual and disk warranty. The product costs \$475. Reader Service number 464.

## An Electronic Filing Cabinet

Sorcim Corporation (2310 Lundy Ave., San Jose, CA 95131) has announced a file management system for personal computers. The CP/M-based program, called SuperData-File Manager, performs many time-consuming office chores—such as filing, searching, information organization, invoice arithmetic, printing, etc.; it even generates mailing lists.

SuperData File Manager is designed to function as an electronic filing cabinet, in which detailed information can be stored for recall at a later time. With SuperData, information can be sorted, compiled and otherwise manipulated from a keyboard.

The program interfaces with



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SuperData operates through "fields," "records" and "files." A field is any unique piece of information. In an employee's dossier, for instance, the information following Name would be one field; another field would be the information following Address. From this, the program goes on to define a record as a collection of related fields, and a file as a collection of records.

With SuperData, information on accounts payable could be filed, sorted and gathered by date due, amount, net-pay intervals, etc. Also, all correspondence relating to some particular business activity, sales account, etc., could be immediately stored and/or accessed without recourse to actual paper files.

SuperData-File Manager costs \$245. Reader Service number 465.

## Stock Option Software

The Stock Option Analysis Program (SOAP) uses the Black-Scholes model to calculate the fair price of options and includes a full Dow Jones interface for the Apple II or Apple II Plus.

The Black-Scholes model is used to calculate the value of European calls. Put options are evaluated using conversion. The option prices are adjusted for the effects of stock dividends. Machine language is used in the Black-Scholes evaluation for increased speed.

With SOAP, the expected profit and loss on transactions involving up to three classes of Put and/or Call options can be calculated for any time until the options expire.

Although both the stock and option prices can be obtained automatically from Dow Jones, the program can also be run manually by entering all required data from the keyboard.

Other features of SOAP include user-specified commission schedules, option to print output including hi-res graphics and machine-language sections for enhanced speed.

SOAP costs \$250 and is available from H & H Scientific, 13507 Pendleton St., Fort Washington, MD 20744. Reader Service number 474.

## Investment Forecaster

Ashton-Tate (9929 West Jefferson Blvd., Culver City, CA 90230) has announced the release of The Bottom Line Strategist. The program is a visual econometric forecasting tool and provides bottom line answers for future business ventures—without programming, using formulas or complex spreadsheets. With complete, sophisticated models, The Strategist allows business executives to analyze and track intricate business scenarios.

The Strategist employs simple and direct user input of business assumptions and displays 11 different types of financial and marketing forecasts. Some of The Strategist's key considerations include how profitable a business will be, how much money is being risked and when break-even points will be established.

The Bottom Line Strategist costs \$400. Reader Service number 472.

## Payroll and Invoicing Software

Micro Associates, Inc. (2300 Highway 365, Box 131, Nederland, TX 77627), has released an integrated Payroll & Invoicing program. The package is designed specifically for organizations that perform services on an hourly basis. An accounts receivable option, which interfaces directly with the invoicing procedure, is also available.

Available for the CP/M operating system and Microsoft MBasic, the package is structured to provide all the normal payroll and invoicing functions, as well as many useful management reports. The program's functions are based only on the input of employee time sheet data.

The Payroll/Invoice program maintains records for up to 250 employees. The payroll computation may be based on a weekly, biweekly,

semimonthly or monthly pay cycle. Reports generated include time sheet proof, payroll register, checks, tax reports and W-2/1099 statements.

The invoicing function allows selective weekly, biweekly or monthly billing, independent of the payroll cycle. The accounts receivable option allows automatic posting of manhour charges and maintains original and current balances for each open invoice.

The package is priced at \$1950; the accounts receivable option is available for \$350. Reader Service number 466.

### Another Full-Screen Editor

Nota Bene Software (PO Box 497, Glenview, IL 60025) has announced Another Full-Screen Editor (AFSE) for the IBM Personal Computer.

AFSE acts as a program editor and, with the included text formatter (APTF), as a word processor. AFSE uses keypad keys to move the cursor over the entire 80x24 screen, so you can see the changes as you make them. You can scroll the window to the left or right, as well as forward and back in the file. You can move or copy lines from one place to another. Find and change commands can be used with function keys on successive occurrences of a character string. Characters can be inserted within a line or a whole line can be inserted. You may save the results of your work in a different file or save multiple copies under different names in the same edit.

AFSE supports the IBM/Epson printer character sets. The program requires 64K bytes of storage, 80-column display, one disk drive and a printer. It costs \$29.95. Reader Service number 473.

### Keeping Track of Expenses

Expense-Track I is a menu-driven program which keeps track of expenses for a home or small business. The program allows you to have several expense files on a disk. A single-sided disk can store 2496 expense entries. Each entry contains the date, de-

scription, category code, method of payment, tax status and expense items.

Expense-Track I checks all items for their validity before they are accepted. Reports can be printed either on screen or printer. While printing the report, you can select the expenses to be listed by specifying tax status (deductible, nondeductible or both), category, method of payment and month.

The program requires no knowledge of accounting. Hardware requirements are an IBM PC with 64K, one disk drive, IBM PC DOS and a printer. It costs \$29.95 and is available from Sapana Micro Software, 1305 South Rouse, Pittsburg, KS 66762. Reader Service number 469.

### Project Estate Taxes

ESTAX is a template for VisiCalc that solves the problem of time-consuming estate planning. ESTAX is aimed primarily at professions involved with estate planning (i.e. attorneys, life insurance agents, CPAs, financial planners, etc.).

ESTAX allows you to compute projected estate taxes. ESTAX lets you plan for variable normal life expectancy, assets growth, charitable gifts, distribution of assets in different patterns, etc.

The program was created by an attorney. It requires an Apple II Plus with 64K and at least one disk drive; VisiCalc 3.3 is also required. ESTAX costs \$49.50 and is manufactured by Single Source Solution, 2699 Clayton Road, Concord, CA 94519. Reader Service number 471.

### Sorting the Mail

Sapana Micro Software (1305 South Rouse, Pittsburg, KS 66762) has released Mail-Track I. The program eases the task of managing domestic and foreign addresses together. The software is designed specifically for the IBM Personal Computer and runs ten to 20 times faster than Basic programs.

Mail-Track I keeps mailing lists in ZIP-code order as you enter data and warns you of duplicate entries; handles

five and nine-digit ZIP codes; allows you to browse, change and print labels one to four across; and sorts and searches any of the items (entry code, name, company name, street address, city, state and ZIP code).

Mail-Track I can create a mailing list of selected labels. Eleven hundred labels can be stored on a single-sided disk. The package sells for \$29.95. An IBM PC with 64K, one disk drive, PC DOS and a printer are required to run Mail-Track I. Reader Service number 468.

### Apple-IBM Connection

Alpha Software Corp. (6 New England Executive Park, Burlington, MA 01803) has introduced a software package which enables information to be transferred between the Apple II and IBM Personal Computer. The Apple-IBM Connection duplicates files created on one machine and

transfers them into files that can be used on the other computer in minutes.

The Apple-IBM Connection enables companies that have been developing VisiCalc models for several years on Apple II computers to automatically transfer the same models to VisiCalc running on the IBM PC. This saves the companies hundreds of hours which would be spent reentering the data or the formulas into the IBM PC.

In addition to transferring files, the package can be used to send and receive electronic mail messages between the two computers.

The Apple-IBM Connection program comes with a floppy disk for the Apple II and a floppy disk for the IBM PC. Once the connection is made, either through a direct cable or a modem, the user can put the program into action with a simple three-step process which is completed in less than five minutes. The software is priced at \$195. Reader Service number 470.

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## Versatile SV-318 Computer

Spectra Video, Inc. (39 West 37th St., New York, NY 10018), has announced the introduction of its Spectravideo SV-318 personal computer system.

The computer features include a Z80A CPU, built-in 32K ROM capacity that is expandable to 144K, built-in extended Microsoft Basic interpreter/internal monitor program (machine code), and built-in 80-column CP/M 2.2 and new CP/M Plus compatibility.

The keyboard features upper- and lowercase alphabets, 52 graphics symbols, ten user-definable functions, and 16 separate colors directly addressable from the keyboard. The keyboard also features a built-in joystick, separate game cartridge slot, ultra-high-resolution graphics (256 x 192) and program "status" line on screen.

The screen layout provides 32 characters per line in the graphics mode and 40 characters per line in the text mode.

The computer is priced at \$299.95. Reader Service number 482.



The new SV-318 personal computer system from Spectra Video, Inc., features 32K ROM (expandable to 96K), 32K RAM (expandable to 144K) built-in extended Microsoft Basic interpreter, 80-column CP/M 2.2 and new CP/M Plus compatibility.

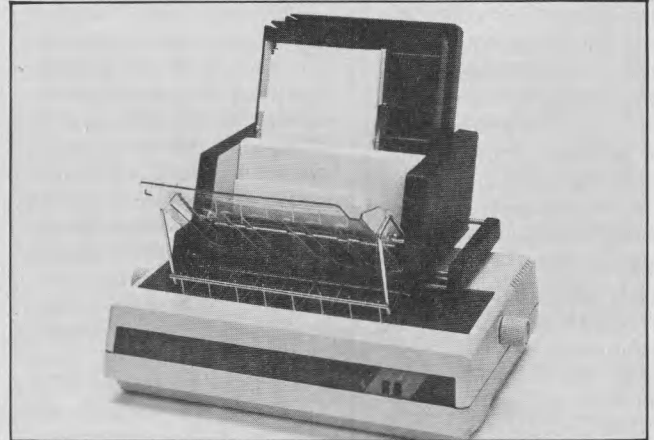
## Increased Speed for IBM

BYAD DS1 is a plug-in expansion circuit board that allows you to increase the speed and productivity of your IBM Personal Computer.

With the BYAD DS1 board you can transform your system into a CP/M computer, giving you access to a larger amount of software.

The DS1 board contains 64K bytes of parity RAM and a Z80B microprocessor. The Dual Systems, Z80 and IBM 8088, achieve improved performance CP/M. DS1 uses the 8088 as an intelligent concurrent I/O processor which performs keyboard type-ahead buffering, printer buffering, disk-track and directory buffering.

Utility programs are provided for reading various 5¼-inch disks directly, moving files, and linking your IBM with a serial port to any existing CP/M system. The BYAD DS1 operates with a minimum of 48K and one disk drive. DS1 costs \$660; an expanded version, which contains a built-in serial port as well as all the features of DS1, called DS2, is available



The Epic Autoflo 580 Sheet Feeder features dual trays for 16- and 24-bond papers or multipart form sets. It can be installed in a minute or two, without the use of tools.

for \$760.

BYAD, Inc., 5345 North Kedzie Ave., Chicago, IL 60625. Reader Service number 481.

## Two Sheet Feeders

Epic Computer Products, Inc. (18381 Bandilier Circle, Fountain Valley, CA 92708), has introduced two sheet feeders for use on most printers.

The Epic Autoflo 545 is a single-tray sheet feeder de-

signed to attach directly to most printers. Fitting virtually any Daisy Wheel printer on the market, Autoflo 545 completely automates the word processing function. A simple mounting bracket is attached to the printer (no tools are needed). The sheet feeder fits into the bracket and is immediately ready for use.

The tray holds up to 230 sheets of 16- to 24-bond paper, as well as multipart form sets. Six-inch to 12-inch width paper can be fed verti-



The Epic Autoflo 545 Sheet Feeder fits most printers on the market and is installed within a couple of minutes.

## Intelligent Serial I/O Processor Board Now Available

The GIMIX Intelligent Three-port RS-232C Serial I/O Interface can significantly increase throughput of a multi-user system by reducing the number of interrupts between user terminals and the host CPU. The Intelligent I/O Board accomplishes this by buffering data transfers between system and users and preprocessing of the data.

Appropriate on-board software and operating system drivers are required. Software and drivers for OS-9 Level 2 will be available shortly from GIMIX.

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cally or horizontally.

The Autoflo 545 is entirely mechanical, using a simplified patented selector mechanism to route and handle paper, so no interface or software is required. It sells for \$995.

The Epic Autoflo 580 comes with two paper trays and one envelope tray. In addition to performing every function of the Epic Autoflo 571/576 line, it feeds collated, finished work to the front of the unit.

Autoflo 580's new, simplified selector mechanisms have replaced electronic circuitry found in earlier units. The improved design not only reduces the price, but also increases reliability. Autoflo 580 costs \$2195. Reader Service number 483.

### 16-Bit Microcomputer

The Altos 586 is a 16-bit, five-user microcomputer. It includes both Ethernet and Altos-Net and thereby allows enormous expansion potential to over 200 workstations and peripherals.

The Altos 586 utilizes the Intel 8086 processor running at 10 MHz, with 256K or 512K of RAM; it can be expanded to one megabyte.

The microcomputer features four multiuser/communication technologies: multiple users on a single computer, high-speed twisted-pair networking, Ethernet, and main-frame communications. The Altos 586 sells for under \$5000.

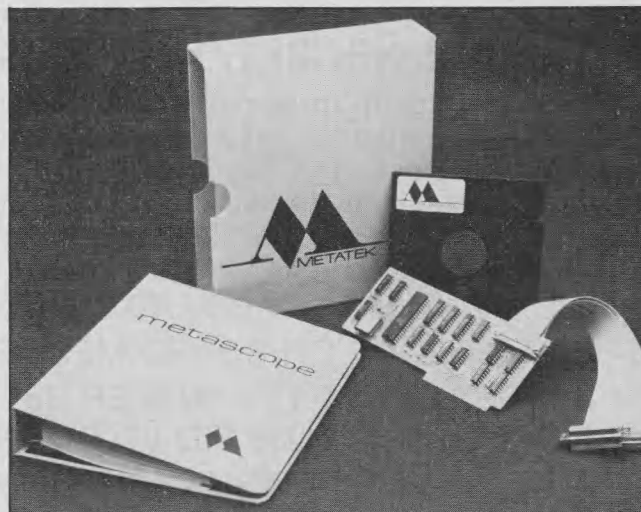
Altos Computer Systems, 2360 Bering Drive, San Jose, CA 95131. Reader Service number 484.

### Apple Data-Line Monitor

Metascope from Metatek, Inc. (12525 Hummingbird St., Minneapolis, MN 55433), is a data-line monitor designed to operate on an Apple II. Metascope consists of a printed circuit board, documentation and the software needed to turn an Apple II into a fully programmable data-line monitor.

The unit is capable of displaying and storing data in asynchronous, byte-oriented synchronous, or bit-oriented synchronous (SDLC, HDLC) modes at speeds up to 19.2K bits per second.

Other features include the ability to start data recording based on a trigger-pattern match, storage of data disk



*Metascope, from Metatek, Inc., is a data-line monitor designed for the Apple II. The unit consists of a printed circuit board, documentation and the software needed to turn your Apple II into a programmable data-line monitor.*

and a programmable host emulation mode that allows the Apple II to act as a sophisticated communications controller which is capable of generating polling sequences with reply. Metascope also has a built-in capability to generate synchronous clock signals in host emulation mode, eliminating the need for modem emulators.

Metascope is being sold and distributed by Parity Products, 3900 Crestview Drive, Minneapolis, MN 55331. The product costs \$895. Reader Service number 485.

### Commodore Peripheral

ESF-20/64 is a stringy-floppy peripheral for the Commodore 64 and VIC-20. The system consists of two units: a miniature endless-loop tape cartridge and a precise electronically direct-drive transport mechanism which plugs into the serial bus connector

on the VIC-20 and Commodore 64.

Features of ESF-20/64 include high reliability, compact size and easy interfacing without any changes to the hardware or software of either the VIC-20 or Commodore 64.

ESF-20/64 tape transport operates at a speed of five inches per second and has a memory capacity of up to 64K. Previously stored data can be transferred to the ESF-20/64 storage via Basic programming.

The ESF-20/64 costs \$199.50. Starter Kits are also available for an additional \$25; the kit includes the user's manual and ten 20-ft. wafers (tape cartridges). The product is manufactured by Exatron, 181 Commercial St., Sunnyvale, CA 94086. Reader Service number 486.

### Cleaning Up Your Printer

Innovative Computer Prod-



*The Altos 586 is a 16-bit, five-user microcomputer from Altos Computer Systems.*



*The ESF-20/64, from Exatron, is a stringy-floppy mass-storage peripheral for the Commodore 64 and VIC-20*





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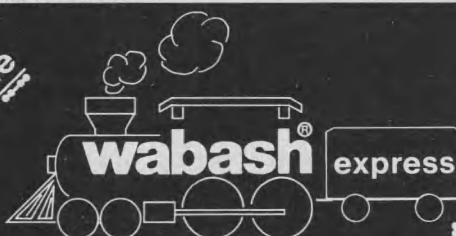
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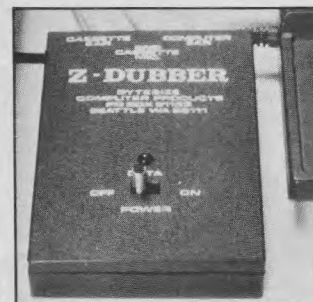
The PerfectData Type Element Cleaning Kit is designed to clean the type elements used on daisy wheel printers (right) and IBM Selectric typewriters (left).

ucts (18360 Oxnard St., Tazana, CA 91360) has introduced the PerfectData Type Element Cleaning Kit. It is designed to clean daisywheel print elements used in most computer printers and intelligent typewriters.

The unit eliminates problems with legibility and document appearance by keeping print characters sharp and smudge-free. The kit consists of a proprietary cleaning unit, a cleaning pad and a bottle of cleaning solution. Each kit provides enough solution for approximately 25 cleanings. New pads and solution can be purchased as needed. The kit sells for \$19.95. Reader Service number 487.

## TS 1000 Cassette Interface

Bytesize Computer Products (PO Box 21123, Seattle, WA 98111) has released an interface which will allow Timex-Sinclair 1000 (ZX81)



The Z-Dubber is an interface for the ZX81, or TS 1000, and a cassette recorder. The interface, from Bytesize Computer Products, makes loading cassette programs easier.

owners to load even the most difficult cassette programs. The product, named Z-Dubber, interfaces the TS 1000 to its cassette recorder, overcoming one of the difficulties experienced when loading cassette programs.

Z-Dubber also allows you to connect two cassette recorders together to create perfect backup copies of your programs. The Z-Dubber operates on two AAA cells and is packaged in a black case. The product costs \$29.95. Reader Service number 488.

## Atari Interface for VIC

Cardco, Inc. (3135 Bayberry, Wichita, KS 67226), in cooperation with The Computer Works (Phoenix, AZ), is producing an interface which will allow Atari video-game cartridges to be plugged in and played on a Commodore VIC-20 computer. The interface costs \$89.95.

Cardco is also manufacturing a new disk operating system for the 1540/1541 Commodore disk drive (\$49.95); a new utility cartridge for the VIC-20 which offers a machine monitor and enhanced Basic commands on a single cartridge (\$39.95); and an interface allowing disk-based programs for the Apple computer to be used on the Commodore-64. Reader Service number 489.

## Four PrintMate Printers

Micro Peripherals, Inc. (4426 South Century Drive, Salt Lake City, UT 84107), has announced four new wide carriage versions of the PrintMate 150 printer. PrintMate 150 models A2 and B2 have standard 16K memory buffers. Models A1 and B1 have 4K and 2K buffers, respectively, allowing fast throughput at 150 cps.

The PrintMate 150 models A1 and A2 include the Soft-Switch front panel keypad for direct control of forms length, print density, horizontal and vertical tabs, baud rate and character set. A SoftSwitch entry enables direct keypad setting of the PrintMate 150 printer. A tune of confirma-



Micro Peripherals, Inc., has announced the release of four new models of its MPI PrintMate 150 dot matrix printer.

tion or a repeat entry signal responds to every keypad entry. Even when it is turned off or unplugged, the PrintMate 150 will retain every detail of its nonvolatile memory. The SoftSwitch may also be added to the PrintMate B models.

Applications packages called AP-PAKS are designed to enable most popular microcomputers, with PrintMate 150, to excel in producing various type styles and graphics. You can utilize the display fonts available with the AP-PAK or create your own; graphics and text may also be intermixed on the same line.

Prices for the MPI PrintMate 150 start at \$995. Reader Service number 490.

### IBM Speech Digitizer

The Supertalker II is a plug-in board that turns the IBM Personal Computer into a talking and teaching machine. Manufactured by Mountain Computer, Inc. (300 El Pueblo Road, Scotts Valley, CA 95066), this speech digitizer enables sound to be entered via a microphone, digitized and stored on diskette for playback at a later time via a loudspeaker or the IBM computer speaker.

The Supertalker II reproduces the actual human voice, similar to an audio tape recorder, and provides inflection.



The Supertalker II, from Mountain Computer, Inc., turns the IBM Personal Computer into a talking and teaching machine.

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The IBM PC, when used with Supertalker II, can be used to teach spelling, math and foreign languages, in speech therapy and as an instructional aid for blind and otherwise handicapped people. Supertalker II can also be used in security systems to alert authorities to potential trouble and in home systems designed for voice control of appliances and other electronic devices.

The Supertalker II includes a plug-in board with 32K bytes of RAM, loudspeaker and microphone. Requirements are a 64K IBM PC with one floppy disk drive. Supertalker II costs \$565. Reader Service number 492.

### Create and Print Drawings

PC-Draw, from Micrografix (8526 Vista View Drive, Dallas, TX 75243), provides you with the ability to create, maintain and print drawings. PC-Draw will support any type of drawing through a unique feature which allows you to custom-design drawing templates. A set of 21 template symbols is displayed on the screen's margin as a symbol menu. Up to five pages of template symbols may be stored in a single symbol menu.

PC-Draw combines a light pen with a keyboard. The light pen lets you select and manipulate the template symbols; the keyboard allows for text entry and paging.

PC-Draw supports compressed, expanded and emphasized printing formats. PC-Draw also provides an extensive set of graphics functions for manipulating template symbols as well as the drawing and template pages. These functions include object scaling, rotation and placement.

PC-Draw requires 128K, color/graphics adapter and Epson MX 80/100 or IBM printer (with Graftrax). It costs \$250. Reader Service number 480.

### The Personal Executive Computer

Microcomputer Technology, Inc. (3304 West MacArthur Blvd., Santa Ana, CA 92704), has announced the

release of the Personal Executive Computer (P.E.C.). The computer offers versatility and is designed to meet the needs of many different buyers.

The P.E.C. offers both 16- and eight-bit capability, so the user can run CP/M 80 software that offers hundreds of applications programs. The 16-bit capability allows the computer to be used for both multiuser and networking operations.

The P.E.C. uses both 16- and eight-bit operating systems such as MS DOS, CP/M 80, CP/M 86 and MP/M, allowing access to an extensive list of application packages, programming languages and software programs. The computer features 64K of internal memory with expansion capability of up to 1024K bytes.

The P.E.C. sells for under \$2000 and includes two 160 disk drives, 83-key keyboard with numeric keypad and interface ports for video, printer and Winchester hard disk drives. Reader Service number 493.

### Apple Modem Card

SSM Microcomputer Products, Inc. (2190 Paragon Drive, San Jose, CA 95131), has announced the release of a 110/300 baud full duplex modem. The modem completes the company's data communications product line of software and hardware for the Apple II computer.

The SSM Apple Modem-Card features half and full duplex, auto answer/auto dial, Touch Tone and pulse dialing, and audio monitoring to provide increased flexibility for use with many systems, including PBX.

The ModemCard plugs directly into any Apple slot (except 0) and requires no additional external devices.

The SSM Apple Modem-Card is priced at \$299. Reader Service number 491.

The price of the JRAM Board from Tall Tree Systems (1036 Los Altos Ave., Los Altos, CA 94022) was listed incorrectly in *Microcomputing's* January issue. The correct price is \$800.



The Personal Executive Computer offers both 16- and eight-bit capability for under \$2000. The computer is manufactured by Microcomputer Technology, Inc.

### Powerful Franklin ACE 1200

Franklin Computer Corporation (7030 Colonial Highway, Pennsauken, NJ 08109) has released a new personal computer, the ACE 1200. The computer features 128K of RAM, a disk drive, disk controller, 80-column card, CP/M card, upper- and lowercase capabilities, a serial/parallel interface and color graphics.

The 72-key keyboard is laid out in typewriter style, making it easier to learn and faster to use. It includes up/down

and left/right cursor control keys, an alpha lock key, a numeric pad and keys with designations frequently used with VisiCalc.

The ACE 1200 comes with a built-in fan and 50-watt power supply which permits additional equipment to be added without concern about power or overheating problems. The ACE 1200 also includes a joystick/game paddle connector and a speaker.

The Franklin ACE 1200, with one disk drive, costs \$2495. Reader Service number 494.



The Franklin ACE 1200 offers 128K of RAM, 80-column card, CP/M card and many other features.



(from page 162)

memory with workspace available for additions. This means that a global search can be done on the whole file with one command!

All the abilities of version 2.0 have been retained in this latest release, but many new features have been added. The latest version allows more space in the work area under most conditions, because a large number of the commands are now contained in overlays which are only loaded when an overlay command is executed. Unless the autload switch is on, the overlay is discarded after execution of the instruction.

Cursor control is now better than ever. It features the ability to move the cursor anywhere on the screen through the use of the keypad keys. They allow you to move the cursor horizontally by letter, word, tab or line (using the home key to go to the left margin and the shift home to go to the first position after the last character on the line); you can also scroll vertically by line (using the up and down arrows) or page (by using the decimal key to scroll up and the zero key to scroll down). Vertical positioning in a file can also be accomplished using the P (for page) command to jump down 24 lines (or up using -P), the Para command to jump to the next paragraph (-Para jumps to the preceding paragraph), B jumps to the last line and T to the top (line 0 in command mode).

Many editing commands are available, some of which can be used directly in screen mode through the use of the control and escape keys. Ctrl K will concatenate the current line with the next, and hitting the escape key followed by a return will break the line at the cursor, putting the rest on the next line. Ctrl-N will change the case of the character at the cursor, Ctrl-R and T remove and set tabs, and Ctrl-E and F scroll up and down a paragraph. The IC, DC, IL and DL keys are active also, but have broader functions when shifted. Formatting with left or left-and-right justification is available for creating beautiful output with automatic left and right margins directly from screen mode.

With the Screen overlay resident, you can even execute most commands by pressing the enter key; to move the cursor to the command line, type the command and press Return. Edit 19 automatically redisplay the screen and returns to where you left off after execution. Even faster execution can be achieved by setting one of the special function keys to one command (or a series of commands). Since a special function key can be set to any series of ASCII characters and be put into Immediate mode, it can be used to insert a line, phrase or group of nonprinting codes anywhere into a file. Want to repeat the last command? Press the "=" and away you go! You don't even have to hit Return!

Edit19, with its macro functions and commands, has the ability to convert English pounds to dollars in a text file. (A macro is a program that runs within the editor, using the editor's commands as instructions.) Edit19's macro instructions include all the normal commands plus the following:

- APPSPFn Append to special function key
- Call Call a macro subroutine
- Command Exit the macro, keeping the macro pending
- Display Display the next line of the macro
- Jump Jump to the label given (conditional jumps allowed)
- MACLCR Set the macro-logical-carriage-return symbol
- Return Return from a macro subroutine
- VARCHR Set the variable character used for variables (macro arguments and labels)
- XSPFn Execute a special function key

Version 3.0 comes with a complete 80-page manual; a separate tutorial disk and manual is available for \$20. Registered owners of version 2.0 can get version 3.0 for \$35. (Steven Robbins, 4610 Spotted Oak Woods, San Antonio, TX 78249. \$80)

**A. E. McLaughlin, Jr.**  
**Brentwood, NY**

## CP/Power

This program acts  
As a monitor and a  
Utility for CP/M systems

CP/Power is a user-oriented front end for CP/M. The expression "front end" means that you load CP/Power (CP for short) after you boot CP/M, and then run subsequent programs through CP using the powerful and user-friendly CP as a monitor and general purpose utility.

The manual supplied with CP is an easy-to-read and simple-to-follow set of instructions consisting of 60 pages. Page 2 has an index of the 43 commands, arranged alphabetically, directly executable by CP with a page reference for each command—no more groping for how to perform a command.

My system consists of a North Star Horizon plus a Morrow eight-inch drive. With CP/M's submit program, my system boots CP/M, loads a link to the eight-inch drive at F000h and then loads CP/Power. After loading CP, the prompt comes up looking like this: A =.

One of the really excellent features of CP is that most of the common commands are menu executable. For example, if you type RUN after the A = prompt,

CP will show the directory on the disk with as many columns as you choose; each program in the directory is assigned a number by CP. CP then asks which program you would like. It is only necessary to type in the assigned number to run the program—no more mistyped names.

One operation that must be performed many times is copying files or disks. With the copy command, CP shows a numbered menu, prompts for the file or files to be copied, and prompts as to the drive to copy to; if you like, you can exercise the option to accept or reject the copying of any file.

For the serious programmer, there are five outstanding commands. The first is Load. This command allows you to load a program anywhere in memory. The second command, Search, allows you to search memory for ASCII and/or hex, using wild cards such as \*.

The third command is Dump. It will dump memory to the screen in hex and/or ASCII.

The fourth command, DS, will display memory in hex, decimal, binary and ASCII, arranged in neat columns, and allows you to substitute any memory location by typing in any one of these formats.

The fifth is the Save command; it allows you to save any part or all of the changed program back to the disk. The Reclaim utility will recover previously deleted files. Some of the other things you can do with CP/Power include:

- Easily switch disks without system crashes or BDOS ERROR ON...
- Operate without a system disk in any drive
- Read or write to any sector and track from the disk independently
- Read or write from disk by CP/M file groups automatically
- Set files to System, Directory, Read only and Write only
- Perform mathematical conversion between ASCII, binary, hex and decimal
- Check sum verification of files or complete disk

CP/Power is currently available for any 8080, 8085, or Z80 CP/M system of at least 20K. (Computing! 2519 Greenwich St., San Francisco, CA 94123. \$149.00)

**Bert Smart**  
**El Cerrito, CA**

## VisiSchedule

Keep projects on  
Schedule with this  
Program for the Apple III

Years ago, as a fledgling chemical engineer, I participated in several revisions of a large oil refinery. To minimize lost production, these projects were scheduled to be completed within the four-week time frame that the processing units were shut down for annual maintenance.

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Systems, business, utility, education, home,  
technical, and occasionally, games.



With millions of gallons of gasoline at stake, the planners took care to ensure that all tasks were scheduled in the proper sequence. Their approach to the scheduling typically involved working with wall-sized sheets upon which each task was indicated by a horizontal bar.

The lengths of the various bars represented the expected durations of the tasks. Often a particular task could not be started until the successful completion of others—the bars were then positioned accordingly. Through this method, planners could determine which tasks were critical to a timely completion of the project.

This hand-drawn critical path chart served well as long as Mr. Murphy did not invoke his infamous laws. An unanticipated delay usually wrought havoc with the planners' schemes.

The late 60's and early 70's saw the proliferation of CPM (not operating system, but Critical Path Method) and PERT (Performance Evaluation and Reporting Technique) software for mainframes. These programs were capable of removing much of the drudgery associated with project scheduling, but were frequently flawed by cumbersome data entry procedures or complex operating instructions.

Enter the microcomputer. The hallmark of micros in the business environment is rapid job turnaround. All that a project

---

**Visi Schedule is  
designed for ease of  
use, and this is  
apparent in both  
the documentation and  
the implementation  
of the menus.**

---

manager would need would be a micro and a friendly software package to bring project scheduling out of the dark ages.

Good news—Apple Computer has provided the machine and the innovative folks at VisiCorp (formerly Personal Software) have issued the software. VisiSchedule is now available for the Apple III Computer.

This version of VisiSchedule requires an Apple III computer with at least 128K and one external disk drive, in addition to the built-in drive. The program does not utilize color images, so any black and white monitor will do. To take advantage of the considerable VisiSchedule report generation capabilities, a printer is recommended.

The fact that VisiSchedule is designed for ease of use is apparent in both the documentation and the implementation of the menus.

The documentation is similar to that supplied with VisiCalc III: The manual contains a thorough tutorial followed by a well-organized reference section. The tutorial, while not intended to be a primer in PERT or CPM, will permit a project manager with no prior microcomputer experience to quickly learn to use the system.

I worked through the tutorial in three one-hour sessions. If a new user were able to study the tutorial without interruption, less time would be required.

The VisiSchedule manual contains many illustrations that depict how the monitor image should appear if the directions have been followed correctly. Failure to obtain an image duplicating what was shown in the manual indicates that the instructions require further study.

VisiCorp has included a flowchart depicting the interrelationships between menus. Software packages containing several levels of menus often omit this feature.

There are only two minor complaints that I could lodge against the documentation: first, a few of the screen images are not well printed and require close scrutiny to render them legible; second, the in-

structions for configuring the boot disk for the user's system fail to mention that the boot disk should be copied first and the new system configuration be generated onto the copy—the boot disk supplied with my system did not have a write-enable notch. The documentation is held in a loose-leaf notebook and contains a pocket-reference card and a vinyl holder for the disks.

The menus employed in VisiSchedule are designed to operate in much the same manner as the Apple III utilities menus. The user can select an item either by using the scroll arrows to move the cursor to the desired item, or by entering the number or the first letter of the item.

Menu items are displayed between two bright horizontal bars at the bottom of the video display. Should an error be made, the program writes a message on the lower bright bar.

The manual's reference section contains a complete list of error messages with a brief description of the error and the actions needed to avoid the error. At no time during my use of the program did any of my keyboard or logic errors cause the program to hang.

To use VisiSchedule, the user first boots the system from the VisiSchedule boot disk and then loads the main program disk. As with VisiCalc, the main VisiSchedule disk is copy-protected. Only one main program disk is included with the package. One backup copy per warranty card holder may be obtained from VisiCorp for \$20. I don't object to copy protection, but I resent having to send additional money for a backup.

VisiSchedule comes with a sample project disk for use with the tutorial. In actual use, project files would be stored on user-supplied disks. A session starts by entering the date (VisiSchedule does not access the system clock if one is installed), the format to be used in reporting dates (i.e., MM/DD/YY), the name of the person preparing the schedule and the type of currency to be used in reporting project costs. The user then proceeds to the main menu, from which a new project file may be started or an existing project file may be loaded from disk and modified.

From the main menu, the following are defined:

- title of the project
- basic time units—days or weeks
- the project start date
- the units to be used in reporting direct costs (singles, thousands or millions of the currency type defined previously)
- the rates for up to nine different levels of manpower skills. For example, a pipeline construction project might require the services of welders, truck drivers, trenchers, inspectors and engineers. Each skill would require a different compensation rate.

The user then enters the jobs that ultimately comprise the overall project. The main menu displays the number of addi-

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tional jobs that may be entered. With a 128K Apple III using the Silentype printer, VisiSchedule will handle 180 jobs per project. A 256K system can take 300 jobs. My 128K system uses an Epson MX-80FT with a PKASO card and initially has room for 160 jobs.

Jobs may be entered in any sequence. For each job, the user supplies information regarding its duration, the amount of direct costs associated with the job, the manpower requirements of the job (the number of each skill-type needed for it), and any jobs that may be prerequisite to the current one. The program then places the jobs in the sequence dictated by prerequisites.

The resultant schedule can be viewed at the top of the display screen, and may be scrolled both horizontally and vertically. The schedule is similar to the old-fashioned hand-drawn types in that jobs are represented by bars proportional to their duration, but that is where the similarity ends. The critical path is marked by the computer to stand out from the noncritical paths. New jobs can be inserted at will, jobs already defined can be readily modified and job completions can be noted.

While the program is scheduling the jobs, it also accumulates the amount of manpower charges incurred by skill type, and accumulates the direct costs.

The program is capable of recognizing holidays and vacation periods, and will show the end-of-job date if these idle periods are observed.

A powerful feature of this package is the ability to "level" the manpower requirements by rearranging the noncritical jobs to minimize the number of men needed. This is done in a manner that will not affect the critical path.

VisiSchedule provides standard file-handling capability including creating, copying, deleting and cataloging the project files on disk. VisiCorp missed a perfect score by omitting a provision to format disks without having to exit the program. Not all users remember to format disks prior to booting the application program.

The reporting capabilities of this package deserve special note. If desired, only a project summary may be printed. Reports detailing the individual jobs can be cut. Jobs may be sorted many ways for reporting, including by name, number, deadline date, late-finish date and early-start date.

The graphic schedule may be printed along with a labor and cost summary. The complete project or selected portions of it are summarized by time periods. All reports may be previewed on the monitor by printing, a feature that saves both time and paper. A nice feature of Visi-

Schedule permits the transfer of data to VisiCalc or other VisiCorp models for subsequent processing through the use of DIF storage format.

In using VisiSchedule, I encountered only a few limitations. One, though minor, is that compensation rates can only be input as whole numbers. Thus, if a skill level gets paid \$750 per week, the thousands' level of cost input cannot be used since the weekly rate would be \$0.75 K. The program would be more flexible if noninteger pay rates could be employed. Another minor problem is if the user decides to change the basic time unit used in the schedule, say from weeks to days, the durations already entered on jobs will not be automatically changed. Thus a job that originally was to take two weeks would appear to take two days after the changing of the time unit.

To VisiCorp's credit, both of these limitations are explicitly mentioned in the tutorial, and should not require much of the user's time to overcome.

For most engineering shops, consultants and contractors, this program will prove to be a valuable tool. Its ease of use, combined with fine documentation, continue in the tradition of VisiCalc. (VisiCorp, 2895 Zanker Road, San Jose, CA 95134. \$295.)

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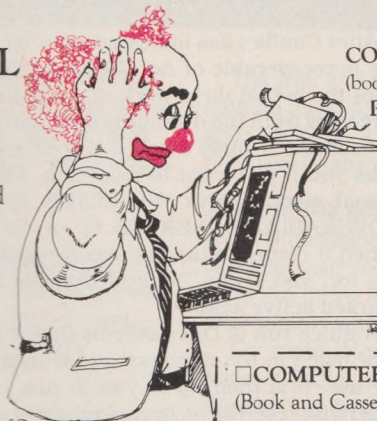
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## Recover Lost CP/M Files An Inexpensive, but High-Quality, Heath Editor A Monitor and Utility Program for CP/M Keeping on Schedule with the Apple III

### UNERA and Conflict

Bring back those  
Files you thought  
Were gone forever

Using the ERA command contained in the CP/M Disk Operating System, it is very easy to erase unnecessary software files—sometimes too easy!

If you're like me, you have accidentally erased a needed program or text file once or twice. Or maybe you intentionally erased something and then realized that you had further use for it. If you didn't have a back-up copy stashed away somewhere, you were in trouble. Given a little luck and some time at the keyboard, you might have been able to recreate the lost file, but who needs all of that extra work?

One thing that most CP/M users don't realize is that ERA "Filename" does not actually erase the named file from the disk. All it does is go to the directory stored on the disk and mark the file inactive so that it does not show up in the directory and is not available for reading into memory for use. If there were some way that you could go into the directory and mark the file active again, it would be as though it had never been erased.

If that sounds like it might be too good to be true, it is—at least sometimes. Unfortunately, complications can enter the picture and make the file recovery operation more difficult.

The complications arise when some other file is saved after the file you are looking for has been erased. The save utility goes to the disk directory looking for vacant space in order to store the file being saved.

The storage space containing files which have previously been marked inactive is fair game for reuse. In other words, a new file may have been stored on top of the erased file that you are trying to recover.

What this means is that you can easily recover a lost file if no Save operation has

taken place since the file was erased. Therefore, the first thing you must do is determine whether any conflicts exist between the file you are trying to recover and any others.

The program that looks for conflicts is called, appropriately enough, Conflict!

Conflict.COM reads each filename (both active and erased) and then compares the track and sector numbers associated with each one. It then prints a list of filenames, identifying those which don't have any conflicts and those that do. If there are conflicting filenames, they are listed also. If there are no conflicts, it should be safe to unerase the file.

If the conflicts listed were erased before the file you are trying to recover was erased, you can safely unerase it. Otherwise, you can just go ahead and unerase it anyway and hope for the best. You might get a part of the desired file. This is better than nothing and gives you a starting point in the reconstruction of the destroyed file.

After Conflict has indicated whether a file is recoverable or not, UNERA.COM does the actual dirty work. It reads the directory from the disk, prints the name of each file it finds marked erased and asks you if you want to recover it. The actual readout says "FILENAME -RECOVERABLE - UNERASE (Y or N)". When it comes to the one you are looking for, you reply "Y" and that file is marked active again.

A quick run of DIR confirms that it is now listed in the directory and is ready for use. It is then up to you to run, or otherwise test, the recovered program to make sure that you got it all.

UNERA and Conflict come with simple, but explicit, manuals and, at \$35 each or \$60 for both, I think that they are well worth the price. I have used them successfully on both single- and double-density disks. They are not the absolute answer to accidentally erased files; however, that is not the fault of these programs, but rather a result of the inner workings of CP/M.

By the way, if you haven't tried Elliam's Master Catalog program, see the December 1980 issue of *Microcomputing* (p. 188) for a description of this inexpensive, but extremely useful, software. I've been using it for over two years to keep track of the more than 1200 programs I have on 59 eight-inch disks in my computer library. I couldn't get along without it! (Elliam Associates, 24000 Bessemer St., Woodland Hills, CA 91367)

**Rod Hallen**  
San Francisco, CA 96528

### Edit 19

A superior Heath  
Editor at a  
Low price

Edit 19 is, as the name suggests, an editor designed for the Heath/Zenith H19 terminal. I believe it is the best combination screen and line editor available for the H8/H19 or H89. At the price of \$80 for version 3.0, no other editor even comes close.

In July, 1980, I was working with my third editor, Paged. I was not satisfied with Edit, which came with my HDOS, or the other line editor I purchased. Edit 19 sounded like what I was looking for and, at \$50, it sounded like a good deal. It was, but I still had a problem. Its one shortcoming was that it couldn't handle files larger than the available storage. This forced me to switch back to Paged whenever I had a large file.

Edit 19 (version 3.0) ended all that! Steve and Kay Robbins have refined and developed this product into one that can handle any size file contained on one disk. Using a "virtual memory" concept and three disk drives, Edit 19 can take a file and, by creating two work files (one for the top and another for the bottom), still have a large amount of the file in

(continued on page 158)



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Circle 55 on Reader Service card.



# THE PROWRITER COMETH.

*(And It Cometh On Like Gangbusters.)*



Evolution.

It's inevitable. An eternal verity.

Just when you think you've got it knocked, and you're resting on your laurels, somebody comes along and makes a dinosaur out of you.

Witness what happened to the Centronics printer when the Epson MX-80 came along in 1981.

And now, witness what's happening to the MX-80 as the ProWriter cometh to be the foremost printer of the decade.

## **SPEED**

MX-80: 80 cps, for 46 full lines per minute throughput.

PROWRITER: 120 cps, for 63 full lines per minute throughput.

## **GRAPHICS**

MX-80: Block graphics standard, fine for things like bar graphs.

PROWRITER: High-resolution graphics features, fine for bar graphs, smooth curves, thin lines, intricate details, etc.

## **PRINTING**

MX-80: Dot matrix business quality.

PROWRITER: Dot matrix correspondence quality, with incremental printing capability standard.

## **FEED**

MX-80: Tractor feed standard; optional friction-feed kit for about \$75 extra.

PROWRITER: Both tractor and friction feed standard.

## **INTERFACE**

MX-80: Parallel interface standard; optional serial interface for about \$75 extra.

PROWRITER: Available standard—either parallel interface or parallel/serial interface.

## **WARRANTY**

MX-80: 90 days, from Epson.

PROWRITER: One full year, from Leading Edge.

## **PRICE**

Heh, heh.

*Marketed Exclusively by Leading Edge Products, Inc., 225 Turnpike Street, Canton, Massachusetts 02021. Call: toll-free 1-800-343-6833; or in Massachusetts call collect (617) 828-8150. Telex 951-624.*

## **LEADING EDGE<sup>®</sup>**

*For a free poster of "Ace"  
(Prowriter's pilot) doing his thing,  
please write us.*

Circle 355 on Reader Service card.